STEEL
The Metalworking Weekly
A PENTON PUBLICATION
OCTOBER 30, 1961

Westinghouse International's Messrs. Jeans and Knox cite benefits of . . .

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Tool Steel Sales Upturn Predicted . . . 89

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COMPLETE CONTENTS—PAGE 15

Want to TALK GEARS?

get down to brass tacks quickly with a DOUBLE DIAMOND *engineer*

All Double Diamond representatives are engineers whose specialty is gears. Whether you're in the thinking, planning, or blueprint stage you can get help from a Double Diamond specialist, whether you buy or not. One thing is certain. If you buy, Double Diamond gears will measure up to your requirements and ours . . . will produce low installed cost . . . will serve economically and dependably . . . will do credit to your product and reputation. A phone call or letter will have you "talking gears" soon.

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AUTOMOTIVE GEAR DIVISION
MANUFACTURING COMPANY
RICHMOND, INDIANA

GEARS FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS
GEAR-MAKERS TO LEADING MANUFACTURERS

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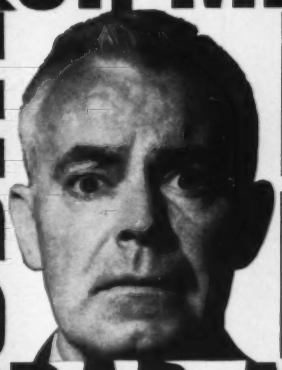
MATERIALS
TAXES
HANDLING
SCRAP AND
WASTAGE

Caught in the profit squeeze? *Call your local steel service center!*

If you buy steel in small or moderate lots, there's a good chance the final cost of service-center steel (processed or not) will be lower than the final cost of steel you buy from a mill and keep in inventory.

The reason is simple: when you buy steel from your service center you reduce or eliminate the "costs of possession" you see above. And those savings can more than offset the few cents more you pay for service-center steel. Why not talk it over today?

Steel Service Centers from coast to coast stock top-quality Bethlehem structurals, sheets, plates, bars, tool steels, and alloy steels. And you get fast delivery.

Steel

for Strength
. . . Economy
. . . Versatility

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

BETHLEHEM STEEL

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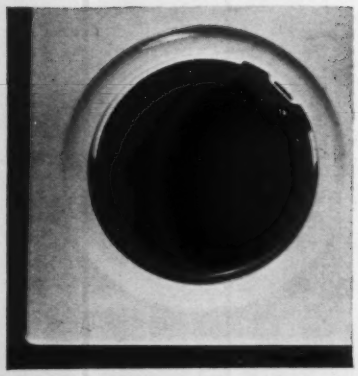
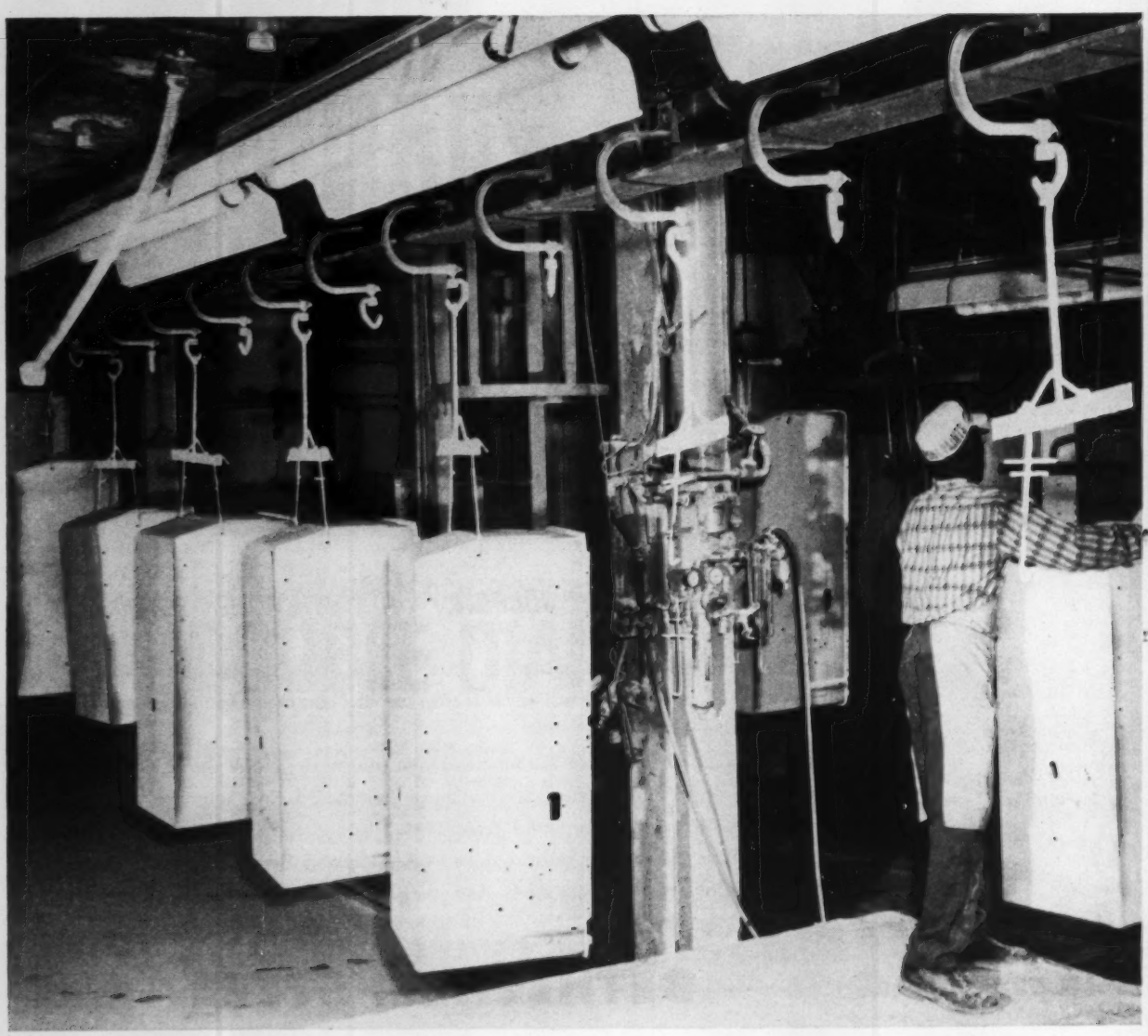


Porcelain Competes



New steels are born at Armco

Enamel "Direct-On" Armco UNIVIT with Paint in Cost

In high-volume production, one-coat, one-fire porcelain enamel on new Armco UNIVIT® has proved cost-competitive with top organic finishes. In finish quality, it is far superior.

Porcelain Enameled Steel

Cash in on public acceptance of steel; use this mark on your products

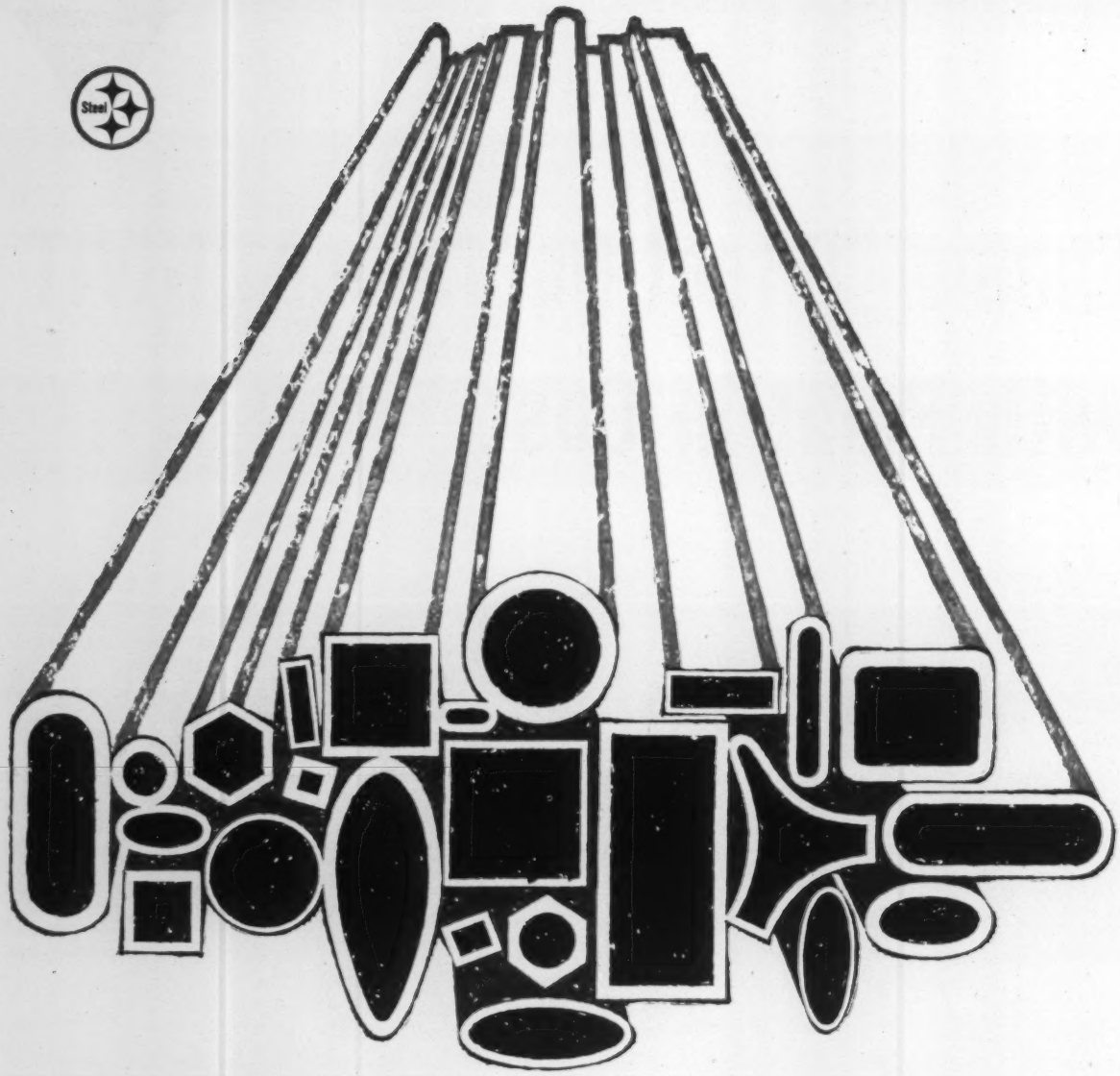
Porcelain enamel finishes have *extra* sales appeal. They're color-fast, smooth and durable, with exceptional resistance to mechanical damage because of the ultra-thin porcelain enamel coatings that are possible with Armco UNIVIT.

UNIVIT's companion grade, for top-quality two-coat porcelain enameling, is Armco Enameling Iron, called the "World's Standard."

These superior base metals meet a wide range of needs for products and parts, because they are made *specifically* for porcelain enameling. **Armco Division, Armco Steel Corporation, 2111 Curtis Street, Middletown, Ohio.**

ARMCO

Armco Division



DESIGN WITH SAFETY...IN ALL SHAPES AND SIZES!

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The Carpenter Steel Co., Alloy Tube Div. /
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Ohio Seamless Tube Div., Copperweld Steel Co. /
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/ PRODUCES WELDED STAINLESS STEEL TUBE
/ PRODUCES WELDED CARBON STEEL TUBE

Regardless of the shape or size, when you specify domestically-produced welded steel tubing, you are assuring uniformity. Wall thicknesses are uniform, concentricity exact. In a rotating part, the result is a better, safer, vibration-free operation. In other applications, the welded steel tube gives you the same design strength as bar stock, with less weight.

The quality producers at left are prepared to help you design with tubing in all weldable grades of carbon, stainless steel and other alloys. You can get useful information from any of them or you can write for your free Booklet 8591, Dept. ST-6, Welded Steel Tube Institute, Inc., Hanna Building, Cleveland 15, Ohio. It will pay in uniformity, safety, and savings in weight.

WELDED STEEL TUBE INSTITUTE, INC.

Man from Mars?

What's that fellow doing in such a getup? He's welding H-11, hot work die steel at 600° F. We're carrying the picture to give you a peek at what's coming up—one of Servicenter's services. This apparition will appear on one of our covers in November.

The fellow works for North American Aviation Inc., a company figuring in still another welding story—in this issue, on Page 62. Associate Editor Ross Whitehead discusses electron beam welding of the B-70 bomber. The method of welding is new; the plane is new; and we are running pictures of fuselage sections which we believe have never been published before.

Guaranteed

Before government and Better Business Bureau checks, guarantee statements were pretty flamboyant, reports Lippincott & Margulies Inc., the New York designer. For instance, an ad for Golden Specific in 1887 "guaranteed the product would cure drunkedness. Was endorsed by everybody but saloon keepers."

Perhaps the first man to give the guarantee status was Montgomery Ward, who built a business on the statement: "Guaranteed satisfaction or your money back." The first guarantee for life came in 1933 with Zippo. The company fixes about 200,000 lighters a year for free and finds the guarantee an excellent sales builder.

Warranties are getting a new lease on life now, spearheaded by the U. S. auto companies. But the ultimate in warranty service in cars is on the Rolls-Royce, which extends for three years.

Incidental Intelligence

Item: The product manager of Kaiser Aluminum & Chemical Sales Inc.'s fresh and frozen baked goods products is, appropriately, J. R. Kitchen.

Item: You can rent $1 million for a day for about $110.

Item: A machine automatically provides 120 route directions at a service station on one of the nation's major highways.

Item: Executives on campus for professional study at the University of Michigan also are offered a voluntary program of physical fitness. Last summer 70 per cent enrolled.

Item: Because of an urban development program, Fisher & Norris, America's oldest anvil works, has had to move after 118 years in the same Trenton, N. J., location. It's now at 325 Monmouth St., Trenton.

Puzzle Corner

The first in with the correct answer to our Oct. 16 puzzle (how many pieces of type does a printer need to set up page numbers for a 288 page book?) was Richard W. Pryor, sales promotion manager of Kaydon Engineering Corp., Muskegon, Mich.

The answer: 756.

Here's another puzzler: If a quantity of two digits is tripled and the digits added to the product, the result is the original quantity with the digits reversed. What is the original quantity?

Ribbons of Rail

Even early rising residents of Washington used to all sorts of unusual events were amazed to see these 142 ft strings of continuous welded rail transported through the streets of the nation's capital. They were on their way to be installed in a land transportation exhibit at the Smithsonian Institution. The rails are part of a cooperative presentation by Bethlehem Steel Co.; Linde Co., a division of Union Carbide Corp.; and the Pennsylvania Railroad.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

Coming

Nov. 13

IN

STEEL

What Fate For Trade Agreements Act?

Are our reciprocal trade agreements really reciprocal? They are the heart of our foreign trade activity, and the statute that makes them possible is up for renewal in 1962.

What are the chances for change next year? What's the meaning for metalworking?

Those and other questions will be discussed Nov. 13 when STEEL examines this important factor in our foreign trade.

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Fluid Power NEWS

OILGEAR 40 Years of Fluid Power

Report No. 11,807 From Oilgear *Application-Engineering* Files

How OILGEAR *Any-Speed* Drive Systems on revolutionary, new, continuous pipe mill provide up to 30% over and under base lineshaft speed for each stand—controlled to ±0.1% accuracy . . . maintain constant interstand speed ratios.

USER: *Lorain (Ohio) Works, National Tube Division, United States Steel Corp.*
Machine Builder — Aetna Standard Division, Blaw-Knox Co., Pittsburgh, Pa.
Differential Drive Manufacturer — Beloit Iron Works, Beloit, Wis.

PROBLEM: To provide accurate, efficient, independent, variable speed drive and control systems between a 1000hp lineshaft drive and 14 form-weld, stretch-reduce stands, and rotary flying hot saw of a new, continuous, buttweld pipe mill designed to produce approx. 237,000 tons of 1¼" to 4" buttweld pipe annually from flash-welded, endless webs of skelp. Delivery speeds range from 700 ft/min. of 1¼" pipe to 150 ft/min. of 4" pipe.

DRIVE REQUIREMENTS: 1. "Hard", non-resilient characteristics of direct gearing — with provision for infinite, variable speed control of any or all stands from 30% under to 30% over predetermined base lineshaft speed. 2. Accurate, preset, speed ratios between stands, capable of precisely maintaining transmitted differential loads to 150 hp — without drift — regardless of load change or lineshaft speed variation. 3. Optional, remote, automatic, "preset", and remote manual control. 4. Direct-reading, constant, visual indication of torque being pulled at each stand, and speed ratios between all adjacent stands. 6. Drive a rotary, flying cut-off saw at maximum mill delivery speeds — synchronized with speed of last active mill stand. 7. Must be compact, with trouble-free dependability for continuous, heavy-duty drive service. 8. One reputable source and responsibility preferred.

OILGEAR *Application-Engineered* HYTAC* Drive System For Continuous, Buttweld Pipe Mill

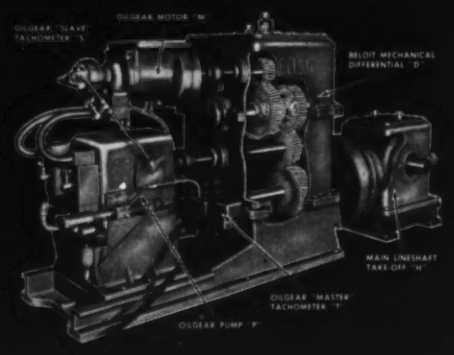
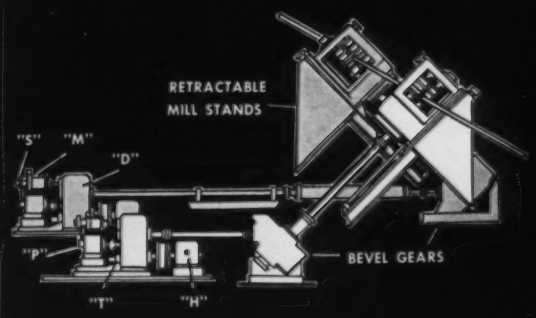


Photo Courtesy of Beloit Iron Works

LEFT: Fluid from Master Tach (T) gives stand drive speed command to control on Pump (P). Slave Tach (S) — direct-connected to Drive Motor (M)—feeds back a flow signal proportional to actual drive speed. Through remote, pushbutton control stations connected to electric pilot motor on Master Tach (T), operator can vary speed of each, or all stands infinitely up to 30% over or under base line-shaft speed . . . with accuracy to ±0.1%.
RIGHT: Two typical stands of seven stand stretch-reduce mill. Each stand is mounted on a steel sled—45° to horizontal—90° in relation to each other. Sled stands are movable by a hydraulic cylinder. A hydraulic clamping mechanism holds sleds in selected positions. Six pipe sizes can be rolled without changing rolls.



SOLUTION: Oilgear *Application-Engineered HYTAC** — Beloit Mechanical Differential Drives provide precise speed and ratio control for 7 form-weld stands, 7 stretch-reduce stands, and a rotary, flying cut-off saw. Overall mechanical efficiency has been determined as well above 90% at full load . . . with remotely controlled speed variable up to 30% over and under base lineshaft speed for any one or all stands — with accuracy maintained within ± 0.1%. Production speeds required for a given pipe size can be preset within a small fraction of 1% — and duplicated at any later date. In this precisely controlled process — a National Tube innovation — the buttwelded pipe is both elongated and reduced in diameter . . . *with wall thickness and pipe diameter held to extremely close tolerances by the accuracy of interstand speed ratios.* An Oilgear "Any-Speed" Drive and Control System automatically synchronizes the rotary, flying cut-off saw with maximum delivery speed of the last active stretch-reduce stand — to cut the continuous pipe in accurate, predetermined lengths.

BIBLIOGRAPHY: *Steel Magazine, Dec. 12, 1960, Page 86; Automation Magazine, May, 1961, Page 68; Steel Magazine, Jan. 30, 1961, Page 114; A paper — "Variable Speed Hydro-Mechanical Drive", by Charles W. Modersohn, Staff Engineer, Beloit Iron Works, presented at N.C.I.H., Oct. 21, 1960.* ①*See Oilgear Fluid Power NEWS 8, 11, 15, 16 — available on request.*

*HYTAC is an Oilgear Company registered trademark.

Installation of Oilgear-Beloit Variable Speed Hydro-Mechanical Drive and Control Systems — successfully pioneered on paper machine drives ① — have exceeded originally specified requirements — without "start-up" problems . . . indicating the value of Oilgear's *Application-Engineering* teamwork throughout all stages of design, building, installation, and testing.

For accurate synchronization of multiple, tandem operations; for combining separate operations to handle webs, tows, or sheets — soft and fragile at one point, strong at another; for continuous operations where tension affects quality — or determines dimensional tolerances . . . all need MORE than conventional drives and controls — they need the precision of Oilgear "*Any-Speed*" Drives and Controls. User's state — "*For the lowest cost per year — with the most advanced, precision controls known to industry . . . it's Oilgear — the pace-setting pioneer!*"

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82 Standard Models

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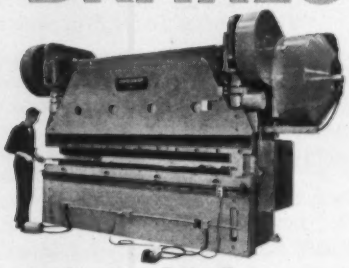

Your best choices for close-tolerance forming, high production, and maximum tonnage at bottom of the stroke.

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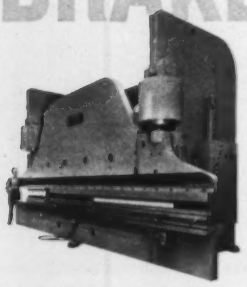

Check these machines if you produce a wide variety of shapes in relatively small lots, or require long stroke.

■ CINCINNATI Press Brakes have exclusive design advantages which reduce ram and bed deflection, cut maintenance, and minimize operator effort. Write or phone today for new catalogs.

THE CINCINNATI SHAPER CO.

Shapers / Shears / Press Brakes Cincinnati 11, Ohio, U. S. A.

In the United Kingdom: The Cincinnati Shaper Co., Ltd., Glasgow, Scotland

Buffed Beauty!
NEW UNIBRITE STAINLESS STEEL STRIP
The only mill buffed strip!
Developed and perfected by Universal-Cyclops.
Both sides mirror bright, extra corrosion resistant.
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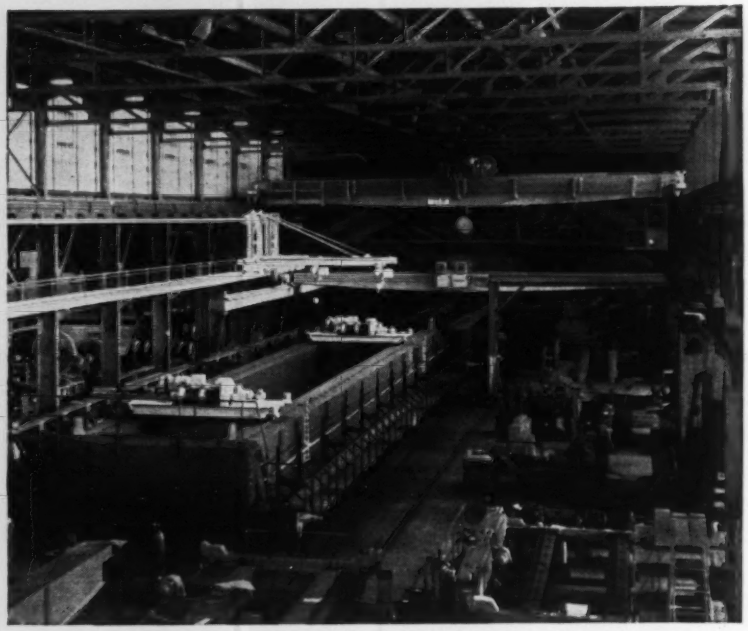

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CALENDAR
OF MEETINGS

Nov. 1-3, Malleable Founders Society: Annual market development conference, Sheraton-Cleveland Hotel, Cleveland. Society's address: 781 Union Commerce Bldg., Cleveland 14, Ohio. Executive vice president: Lowell D. Ryan.

Nov. 2-3, American Zinc Institute Inc.: Galvanizers committee meeting of the steel industry, Sheraton Hotel, Philadelphia. Institute's address: 292 Madison Ave., New York 17, N. Y. Executive vice president: J. L. Kimberley.

Nov. 6-9, Atomic Industrial Forum Inc.: Annual conference and exhibit (with American Nuclear Society), Conrad Hilton Hotel, Chicago. Forum's address: 850 Third Ave., New York 22, N. Y. Executive manager: Charles Robbins.

Nov. 7-10, Packaging Machinery Manufacturers Institute: PMMI Show, Cobo Hall, Detroit. Institute's address: 60 E. 42nd St., New York 17, N. Y. Executive director: Russell L. Sears.

Nov. 9-10, Society of Automotive Engineers Inc.: National fuels and lubricants meeting, Shamrock Hotel, Houston. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary and general manager: Joseph Gilbert.

Nov. 12-15, Air-Conditioning & Refrigeration Institute: Annual meeting, The Homestead, Hot Springs, Va. Institute's address: 1346 Connecticut Ave. N.W., Washington 6, D. C. Managing director: George S. Jones Jr.

Nov. 13-15, Steel Founders' Society of America: Technical and operating conference, Pick-Carter Hotel, Cleveland. Society's address: 606 Terminal Tower, Cleveland 13, Ohio. Executive vice president: F. Kermit Donaldson.

Nov. 15-17, National Foundry Association: Annual meeting, Savoy Hilton Hotel, New York. Association's address: 4321 St. Charles Rd., Bellwood, Ill. Executive secretary: C. T. Sheehan.

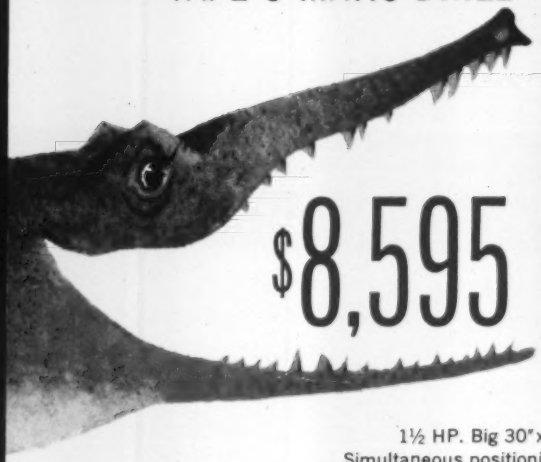
Nov. 15-18, National Association of Aluminum Distributors: Annual convention, Arizona-Biltmore Hotel, Phoenix, Ariz. Association's address: 1900 Arch St., Philadelphia 3, Pa. Secretary: R. Bruce Wall.

Nov. 16, National Electrical Manufacturers Association: Annual meeting, Plaza Hotel, New York. Association's address: 155 E. 44th St., New York 17, N. Y. Managing director: J. F. Miller.

Nov. 26-Dec. 1, American Society of Mechanical Engineers: Winter meeting, Statler Hilton Hotel, New York. Society's address 345 E. 47th St., New York, N. Y. Secretary: O. B. Schier.

WE'RE PUTTING OUR MONEY WHERE OUR MOUTH IS!

WITH A 90-DAY MONEY-BACK GUARANTEE ON THE NEW PRATT & WHITNEY TAPE-O-MATIC DRILL



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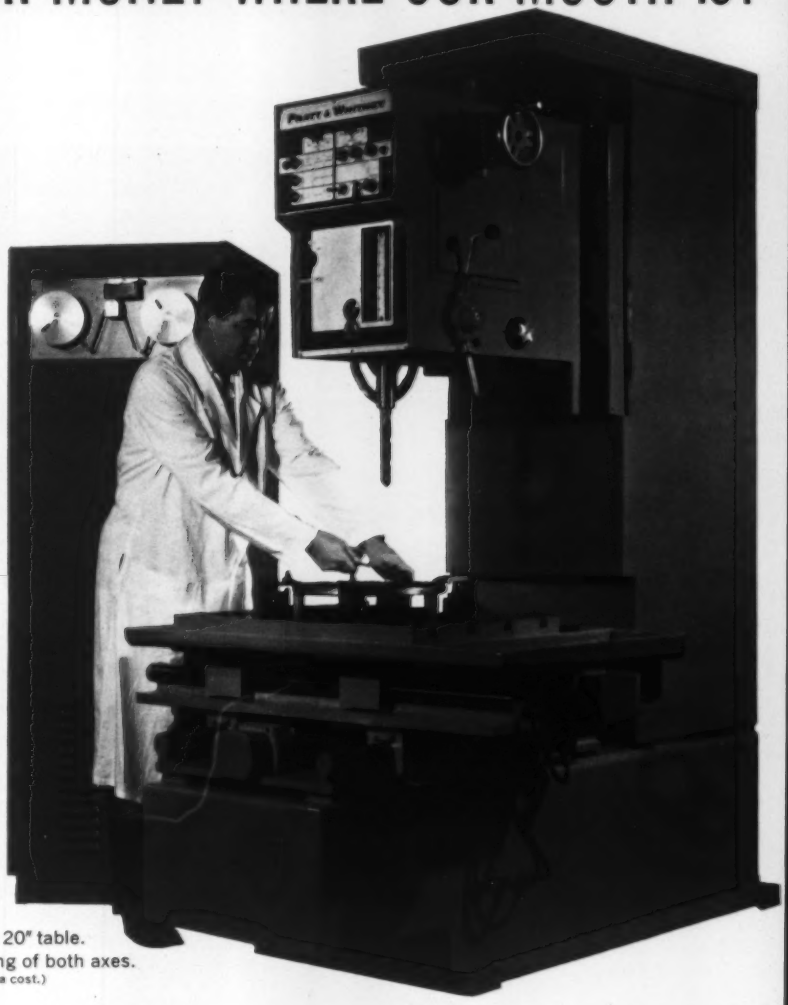

1½ HP. Big 30" x 20" table.
Simultaneous positioning of both axes.
(3 HP. optional at extra cost.)

NOW! FOR THE FIRST TIME A NUMERICALLY CONTROLLED DRILL FOR ONLY $8,595 GUARANTEED TO REDUCE YOUR DRILLING COSTS

At last . . . a drill with the finest, transistorized, numerical-control system available for only $8,595 . . . because P&W brings mass production to the machine tool industry for the first time . . . yet maintains the 100-year tradition of P&W quality.

The TAPE-O-MATIC enables **you** to benefit from numerical control . . . to gain a vitally-needed, important competitive edge.

WE BELIEVE IN THIS NEW DRILL SO STRONGLY THAT WE OFFER:

1 90-DAY, MONEY-BACK GUARANTEE. If by 90 days after purchase, this drill has not reduced your drilling costs, return it for refund, less transportation costs.

2 5-YEAR WARRANTY. We fully warrant the TAPE-O-MATIC drill against defective parts and workmanship for 5 years from date of purchase.

3 UNIQUE TERMS. You can buy TAPE-O-MATIC using our exclusive Trade-in Plan. You can purchase the drill outright, lease it, or lease it with option to buy. ONE PER CENT CASH DISCOUNT FOR PAYMENT IN 10 DAYS.

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HEADQUARTERS FOR AMERICA'S WAR AGAINST OBSOLESCENCE

Aluminum buyers:

Get production-ready aluminum in *exact lengths and widths, generally on a net weight basis.* No scrap with this unique aluminum sheet plan, offered by Ryerson plants across the nation.

Order the exact sizes you need for your production runs—Ryerson cuts them to size and schedules delivery to match your production-line pace. You save the cost of needless scrap, save the cost of cutting, save the cost of inventory, and release valuable storage space for other uses.

At Ryerson you'll find the widest selection of aluminum alloys, tempers and gauges—plus expert technical help on selection and fabrication problems. This is just one more example of how Ryerson Metalogics gives you the most value for your purchasing dollar. So be "Metalogical"—call Ryerson.

RYERSON METALOGICS

JOSEPH T. RYERSON & SON, INC., MEMBER OF THE STEEL FAMILY

STEEL · ALUMINUM · PLASTICS · METALWORKING MACHINERY

Inland President Sees Upturn for Steel in '62

"I expect 1961 ingot production to be about 100 million tons. And for 1962, I estimate ingot production will be 10 to 15 per cent above that," says John F. Smith Jr., president, Inland Steel Co. His reasons: Spending in all major sectors of the economy is expanding, inventory policies are swinging from liquidation to accumulation, government spending is likely to increase further, capital spending should continue picking up, and consumer spending may give the industry a "shot in the arm."

Steel Imports Rise, Exports Drop

Imports of steel mill products rose in August for the seventh consecutive month, bringing the total for the first eight months to 1.9 million tons, says the Commerce Department. Valued at $233 million, the imports were short of the $344 million in the corresponding 1960 period which was influenced by orders placed during the 1959 strike. August exports dropped to less than half the sales registered in August of last year. Exports for the first eight months totaled $267 million compared with $426 million in the 1960 period.

Metal Cutting Tool Orders Jump to 4½ Year High

September net new orders for metal cutting machine tools totaled $56.75 million—the highest monthly figure since March 1957, and 23.5 per cent above the monthly average for 1961, reports the National Machine Tool Builders' Association. Foreign orders jumped $7.4 million above the August level and domestic orders advanced by $4.55 million. New orders for both cutting and forming tools totaled $67.3 million, bringing the nine month figure to $414.45 million (up 8.7 per cent from the year ago period). The association says September shipments of both types rose to $52.1 million from August's $47 million. Shipments during the nine month period ran 6.3 per cent below the same period of 1960 however. Of $470 million worth of shipments so far this year, $141.4 million have gone to foreign buyers.

September Home Building Well Ahead of Year Ago Pace

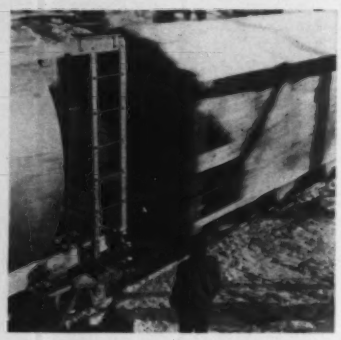
Starts on private homes in September were at a seasonally adjusted annual rate of 1,360,000 units (3 per cent above the August level), reports the Census Bureau. The 120,000 starts represent a 24 per cent improvement over the year ago rate.

Gas Equipment Producers Hope for Tax Relief

The White House move to bolster the textile industry by permitting faster depreciation writeoffs is stirring hopes for similar concessions in other in-

dustries. For instance, Lowell F. Crouse, chairman of the Gas Appliance Manufacturers Association's Industrial Equipment Division, believes such a move would double the rate of production of machine tools and processing equipment. He says there are "hundreds of cases" in which "action on bids for machine construction made as far back as 1959 is still being delayed largely because of the lack of a tax break."

Materials Battle Looms in Rail Equipment Market



Planned "torture" helped prove Aluminium Ltd.'s Tank-Hopper car for railroad service. In a series of more than 35 impact tests, a loaded car (right) smashed into the standing prototype. Impact loads approached 1 million lb. In a three month fatigue test, the car was subjected to the equivalent of 30 years' service. At stake: Aluminum and steel producers are vying for the lucrative railroad equipment market. See Page 38.

Increase in Farm Equipment Sales Predicted

Farm equipment sales should increase 5 per cent next year, says Samuel W. White Jr., president, Oliver Corp., provided the weather is favorable. Mr. White states the forecast "is bulwarked on a probable 1961 realized net farm income about 10 per cent higher than last year's—$13 billion compared with $11.7 billion—and on farmers' needs for bigger, technologically improved machinery to help them work bigger acreages with less manpower and at lower unit production costs."

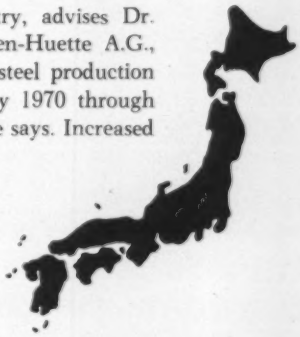
Major Changes Coming in Manpower Management

Profound, far-reaching changes in manpower planning and utilization during the next two decades are foreseen by Forrest H. Kirkpatrick, assistant to the president, Wheeling Steel Corp. "The single largest and most influential class of employees . . . will be professionals and specialists," he says. Changes are needed to fully utilize their talents and training, provide professional status and opportunity for growth, and make equitable distribution of economic rewards. The growth of this creative intellectual class also means "management by objectives and self-control will inevitably replace management by authority and externally imposed control," predicts Mr. Kirkpatrick.

Stop Tool Shipments to Reds, Advises Expert

Joseph A. Gwyer, specialist on Soviet industry, told a Senate subcommittee that no machine tools should be shipped to the Communist Bloc. He says Russian machine tools aren't as good as ours, nor do the Reds produce as many. Look for intense Congressional pressure to force the administration to halt all shipments of strategic products to the Reds.

Watch Japan, Warns German Steel Executive



Keep an eye on Japan's growing steel industry, advises Dr. Hans-Guenther Sohl, president, August Thyssen-Huette A.G., West German steelmaker. Japan aims to raise steel production from 24.4 million to 52.9 million ingot tons by 1970 through capital outlays averaging $850 million a year, he says. Increased capacity will give it an opportunity to push into markets traditionally regarded as the domain of U. S. and European producers. Japan's dependency on imported raw materials will also be greatly extended, Dr. Sohl points out. Ore imports, for instance, will jump from 16.5 million to nearly 54 million tons annually.

$16 Billion to Be Spent on Research Next Year

Research spending in the U. S. will total nearly $16 billion next year, predicted economist George W. James of Battelle Memorial Institute at last week's annual meeting of the National Association of Business Economists in Chicago. Government will spend about $10 billion, reflecting stepped up space and defense programs, he said; industry will invest $5.5 billion, while universities and foundations will spend $350 million. Research spending totaled $14 billion in 1960 vs. only $3 billion in 1950.

Trade Balance for Business Machines Improves

U. S. business machine exports totaled $154.8 million in the first half, up 64.5 per cent from those of the 1960 period, and imports rose 33.2 per cent to $47.2 million. For the first time in several years, the percentage increase in exports surpassed the percentage increase in imports, reports the Commerce Department. Here's where the exports went:

(Millions of dollars)

	First Half 1961	First Half 1960	Percentage Change
Common Market	45.8	21.9	109.4
European Free Trade Association	26.2	14.4	81.4
Other Europe	2.4	1.3	81.9
Asia	27.6	16.4	67.8
Canada	27.4	21.3	28.8
South America	14.5	8.9	62.6
Central America	5.0	4.7	6.9
Oceania	3.1	2.0	57.4
Africa	1.9	2.3	−17.8
Other	0.8	0.9	−3.5

Four Nations Receive Industrial Aid

The Export-Import Bank of Washington last week authorized a $15.6 million credit to Fuji Iron & Steel Co. Ltd., Tokyo, Japan, for the purchase of U. S. steel mill equipment . . . A group of U. S. steel company executives recently flew to New Delhi to explore the possibilities of helping India build a fourth steel mill. Three have been constructed with British, German, and Russian aid . . . The International Bank for Reconstruction & Development has

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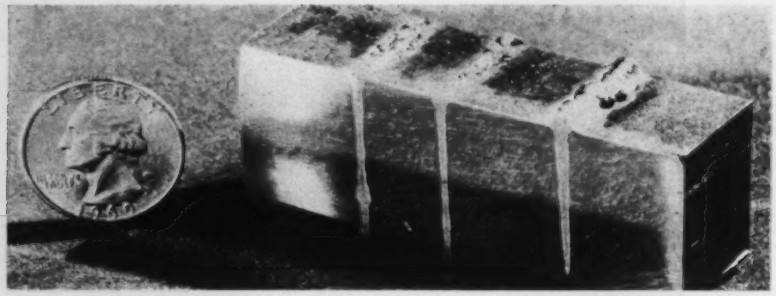
loaned $34 million to National Power Corp. of the Philippines to help finance a large hydroelectric project. The bank has also loaned India $50 million to meet the cost of equipment and materials over the coming year in its railway development program.

Electron Beam Welding Key Tool in Making B-70



Electron beam welds (like those above) are a boon to Space Age fabrication, says North American Aviation Inc. The firm has studied the technique and is using it in the construction of the B-70 superbomber. Its findings tend to support the claims of welding equipment manufacturers that the technique produces stronger welds and handles some metals that cannot be joined any other way. See Page 62.

Straws in the Wind

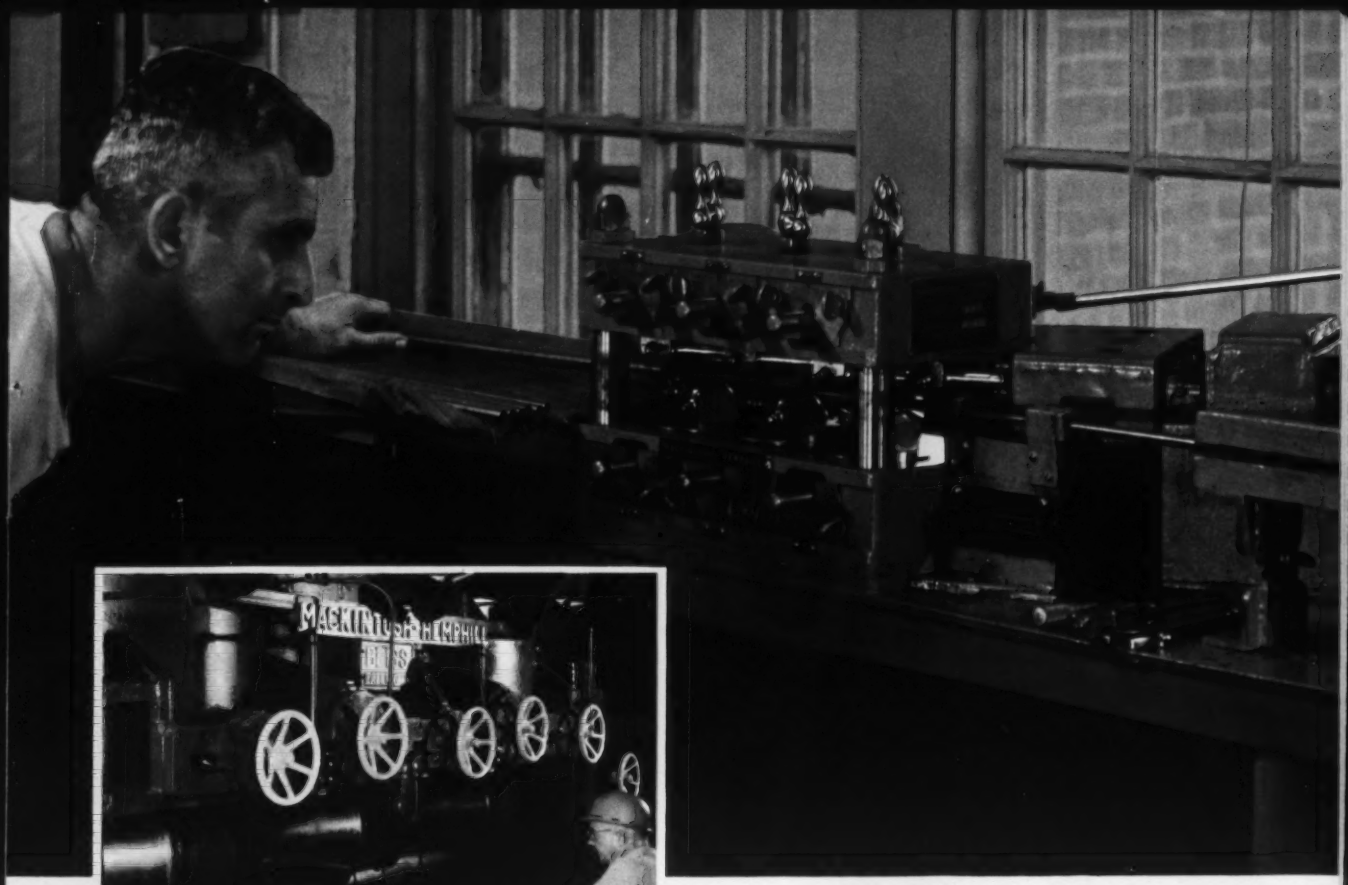
Electro-Motive Div., General Motors Corp., reveals it has orders for 20 of its $195,000 GP-30 (general purpose) diesel locomotives. The new, 2250 hp units feature interchangeability of many components with previous models . . . New orders of durable goods manufacturers rose 1 per cent in September, while their sales declined 1 per cent, reports the Commerce Department . . . Material Handling Institute Inc. says bookings for the first eight months of the year were 2 per cent behind the 1960 pace . . . British steel production in September fell 17 per cent below the year ago level. United Steel Co. is slowing its expansion program, and others may follow . . . The Atomic Energy Commission is seeking technical personnel to fill jobs at salaries ranging from $8000 to $15,000.

Metalworking Pulse

The Business Trend: Economists say consumer purchases must begin to pick up in the next few weeks to sustain forecasts of a 1962 boom year. **Autos:** Motordom is acting like sales approaching 1955's are in sight. Output forecasts jumped as Ford shot ahead after a period on short rations. **Steel:** Detroit's optimism apparently is slow in getting to steel producers. Because automotive demand has not been up to expectations, they have slowed ingot output.

- **INDUSTRIAL PRODUCTION INDEX**
  (1947-49=100)
  Week ended Oct. 21 . . . . 171†
  Year ago 153
  Details on Page 49
- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended Oct. 28 . . 170,000*
  Year ago 150,019
  Details on Page 46
- **STEEL INGOT OUTPUT (TONS)**
  Week ended Oct. 28 2,035,000*
  Week ago 2,042,000
  Details on Page 92

†Preliminary. *Estimated.



JEWELERS' TUBING
OR 16-INCH PIPE

One pass... and it's straight and round as a gun barrel

The largest rotary tube straightener we make weighs more than 80 tons and straightens 16-inch pipe with ease; the rolls of the smallest model are only 3/4 of an inch in diameter and weigh 4 ounces apiece. Identical to the big one in everything but size, its three sets of top- and bottom-driven rolls straighten tubing with O.D.'s that must be measured with a micrometer . . . O.D.'s as small as .030-inch.

Mack-Hemp's line of fourteen straightener models covers every size of pipe and tubing between these two extremes, and is used with practically every metal and alloy . . . for such varied applications as refrigerator tubing, thermocouples, fuel elements, electrical conduit, heat exchangers, and even jewelry. No matter what the size, every Mack-Hemp straightener brings pipe and tube to perfect straightness and roundness in a single pass, at speeds that range to 800 feet per minute or more. Each works without guides, so there are no marks on the straightened tubing. And each is designed with an open, three-post construction that makes for easy maintenance and resetting of the rolls for various tube diameters.

NEW 24-PAGE TECHNICAL BULLETIN NOW AVAILABLE . . . tells how to solve straightening problems . . . how to adjust rolls and straighteners. Gives tips on rod straightening . . . light tempering . . . derodding of tubing. Cites nine different ferrous and non-ferrous case histories. Send for your copy today.

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a new concept for cutting grinding costs:

RELIABLE
QUALITY
PRODUCTION

Consistent, automatic repeat performance of a cylindrical grinder is dependent upon the combined reliability of work support, wheel support, wheelfeed and wheel dressing.

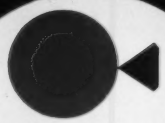
The exclusive features of the new Landis plain grinders are built around these four machine essentials to assure reliable, quality production.

Landis 10" R semi-automatic plain grinder with angular wheelhead combines all new features.

Work Support. Exclusive wedge work rest and loaded ball spindle footstock give maximum rigidity to work parts.

Wheel Support. Exclusive Microsphere bearing reduces sparkout time, speeds production.

Wheelfeed. Exclusive Microfeed® a pulsefeed in millionths to final size meets tolerances on a production basis.



Wheel Dressing. Exclusive Truform dresser with shake-free construction for exact reproduction of all wheel profiles.

LANDIS

LANDIS TOOL COMPANY, WAYNESBORO, PA.

Higher strength steels make more sense for this rugged, lightweight trailer

(It carries 1100 pounds more)—Here is a high-capacity dump body trailer that gives you a substantial dead weight reduction for only a few cents per pound of payload increase!

This trailer, which went into service in January, 1961, hauling both hot and cold slag, is proof that each pound of payload increase you buy can cost as little as 35¢ per pound.

To prove our point, this 27-cubic-yard trailer was created by the TEC Division of the Heil Company, Cleveland, Ohio, in conjunction with the Applied Research Laboratory of United States Steel. Using the USS Family of Steels—carbon steel, USS COR-TEN High-Strength Low-Alloy Steel (50,000 psi minimum yield point) and USS "T-1" Constructional Alloy Steel (100,000 psi minimum yield strength)—compared to a similar capacity carbon steel trailer, we were able to reduce the weight of this one by 1100 pounds—at a cost of only *35¢ for each one of the 1100 pounds.*

This was done by using 14-gage USS COR-TEN Steel for the trailer body sides, 12-gage in the floor, and USS "T-1" Steel in the high-strength draft arms.

As a bonus, both USS COR-TEN and "T-1" Steels give you four to six times the atmospheric corrosion resistance of carbon steel. You also get high resistance to abrasion and impact. USS COR-TEN holds paints considerably longer than carbon steel.

In other words, pound for pound, higher-strength steels have yet to be equaled by any other material when you consider strength, endurance and cost.

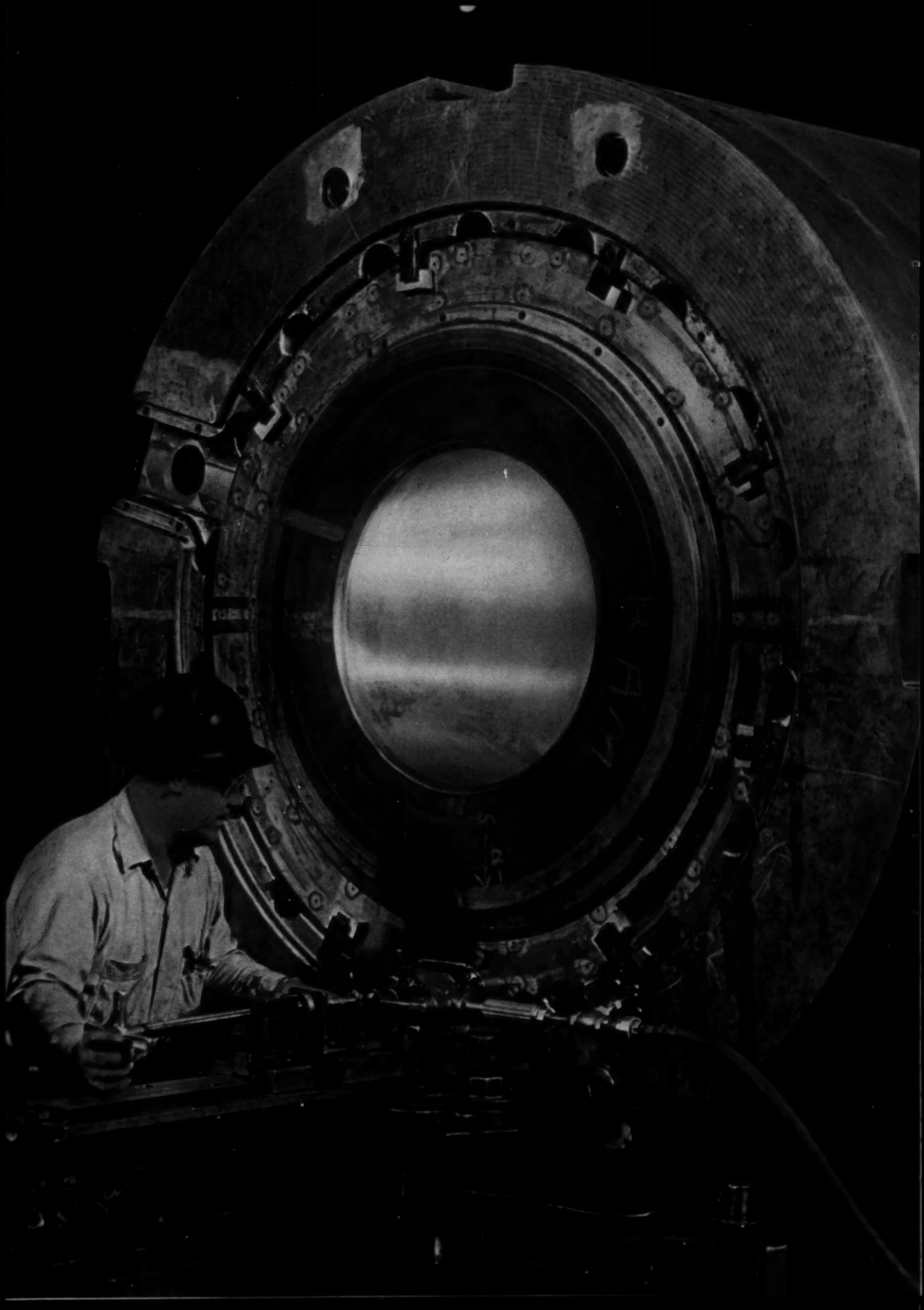
The tremendous success of this model has led to the design of a similar steel trailer that will lop off still another 400 pounds of dead weight (9100 lbs. tare). For more information about USS "T-1" Constructional Alloy or our various grades of high strength steels, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS, COR-TEN and "T-1" are registered trademarks.

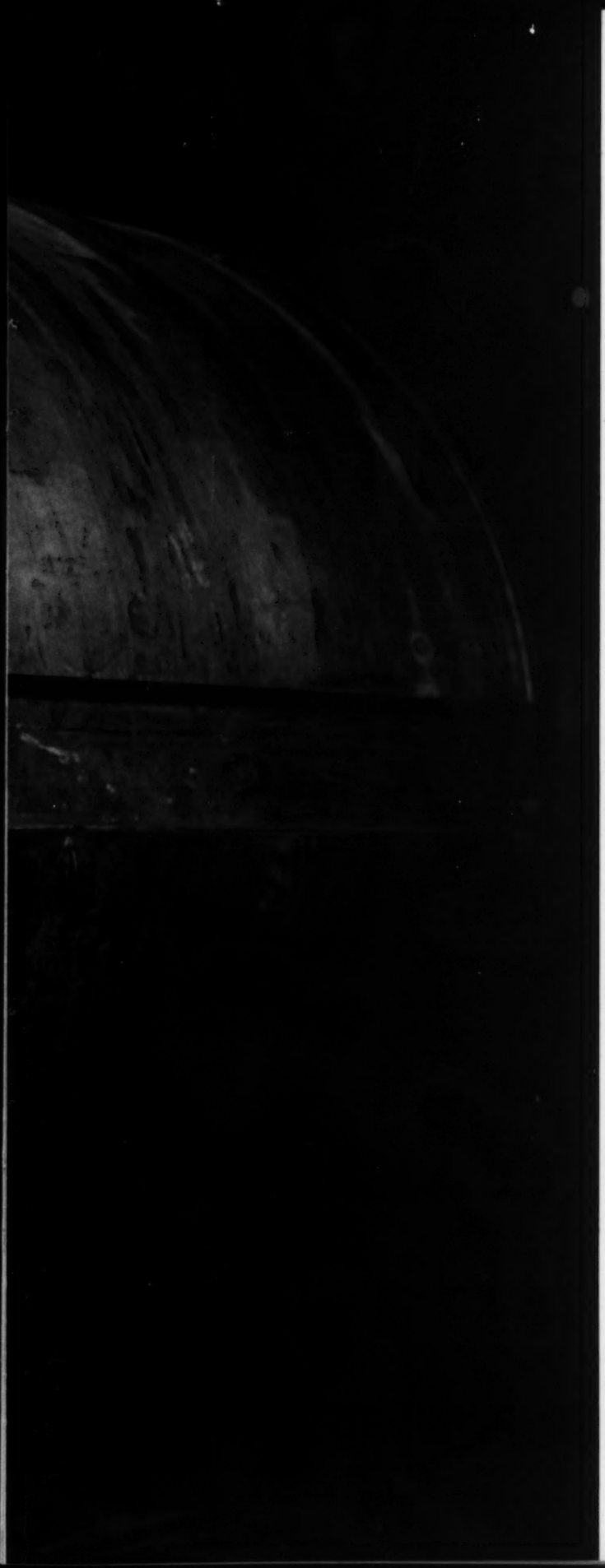
United States Steel Corporation • Columbia-Geneva Steel Division • National Tube Division • Tennessee Coal and Iron Division • United States Steel Supply Division • United States Steel Export Company

United States Steel

This mark tells you a product is made of modern, dependable Steel.

This new frameless steel trailer built with USS COR-TEN and "T-1" Steels easily withstood a punishing seven-month service test hauling 23,000 tons of hot and cold slag and is ready for several more years of gruelling work. Operator: Hawkins Contracting Company, Pittsburgh, Pennsylvania.





This mark tells you a product
is made of modern, dependable Steel

Extrusion Press Gets Billet-Proof USS Forged Jacket

Only a forging provides the ultimate combination of strength, toughness and soundness needed for an extrusion press container assembly like this one for the Dow Metal Products Company Division of the Dow Chemical Company. This two-piece USS Quality Forged assembly, in use in "Dow's" 14,000-ton-capacity horizontal extrusion press, withstands tremendous forces exerted by the ram during extrusion of magnesium and other nonferrous shapes at temperatures up to 900°F.

The photograph at the left shows the massiveness of the 40-ton alloy steel container jacket (viewed from the ram end) and its smaller, 8-ton tool-steel "liner" that measures 40¾" OD x 25⅛" ID x 75" long. Although what you see in the photograph looks like one piece of steel, it's actually two: one large sleeve (the container jacket) "shrink-fitted" over a smaller, bored cylinder (the "liner"). However, the most important aspects cannot be photographed.

Forgings for applications such as this one must start with the highest quality electric furnace ingots, be expertly forged, and then receive skillful heat-treating and very accurate machining. The eighteen 3½"-diameter electric heater holes (partially obscured by a circular cover plate) drilled completely through the 75" length of the hardened container jacket, and the careful shrinking of the jacket over the liner, are only two such examples of the precision work we have in mind.

This same careful attention to detail will be applied to your order by all the men in our Forgings Division. United States Steel produces Quality Forgings for such applications as drop hammer and press parts, rolls and sleeves, turbine and generator rotors, propulsion and shipshafting, and miscellaneous medium and heavy forgings. For more information, contact our nearest district sales office or write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS is a registered trademark.

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USS United States Steel

USS 9% Nickel Steel reduces cost of handling cryogenic liquids

More than 400 vessels of 9% nickel steel have been put to use storing liquids at temperatures down to −320°F. The hemispherical heads shown being fabricated here are designed for liquid oxygen storage at −297°F. Some of these ASME Code designed and stamped vessels were fabricated of USS 9% Nickel Steel at Pittsburgh-Des Moines Steel Company for use by Air Reduction Company, Inc., New York.

The vessels are 9 feet in diameter and 16 feet in overall length including the heads. They will operate at a normal design pressure of 270 psi. Plate thicknesses are 0.700" in shell plates and 0.375" and 0.350" in head segments. Tanks were stress-relieved after welding.

Low carbon, 9% nickel alloy steel was developed to provide a ductile, moderately priced steel for storing such cryogenic liquids as ethylene, methane, oxygen and nitrogen in the range from −150°F to −320°F.

USS 9% Nickel Steel maintains good strength, toughness, and excellent ductility at sub-zero temperatures down to −320°F. At room temperature it has a minimum yield strength of 65,000 psi and high charpy impact values, while at −320°F, double-normalized and tempered 9% nickel steel shows a 36% increase in yield strength, and charpy keyhole impact values range from 20 to 40 ft/lbs. Since tensile properties and impact values are even better for quenched and tempered 9% nickel steel, recognition by various code groups of the suitability of such treatment is now being considered.

10% lower costs. Accumulated data on cryogenic vessels of 9% nickel steel suggest that minimum savings of 10% of the final erected costs can be expected from advantages in welding and fabrication alone, in comparison with non-ferrous metals. Economies due to higher strength are also possible. An allowable ASME working stress of up to 23,750 psi permits reduction in vessel weight with lower unit costs.

Acceptance of 9% nickel steel in the as-welded condition by code and regulatory bodies would make this steel even more attractive to designers and fabricators since the vessel would cost less to produce without stress-relieving, and would be less expensive.

Results of "Operation Cryogenics."

Impact tests conducted late in 1960 on three full-size rectangular vessels in the as-welded condition (not stress relieved) proved they could withstand impacts far beyond any likely to occur in service. Burst tests on six cylindrical vessels, also at −320°F, showed that burst pressure for the three as-welded vessels (not stress relieved) averaged higher than that of the three stress-relieved vessels. Burst pressure for all six vessels was at least four times the design pressure. These tests proved that 9% nickel steel has the high strength, low temperature toughness, and weldability needed for cryogenic pressure vessels.

For the complete story of USS 9% Nickel Steel, including all the details of "Operation Cryogenics," write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

United States Steel Corporation · Columbia-Geneva Steel Division · National Tube Division · Tennessee Coal and Iron Division · United States Steel Supply Division · United States Steel Export Company

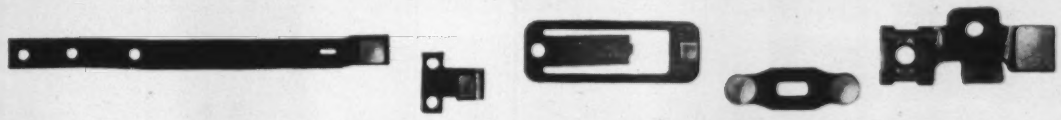
For maximum strength . . . toughness . . . safety

USS United States Steel

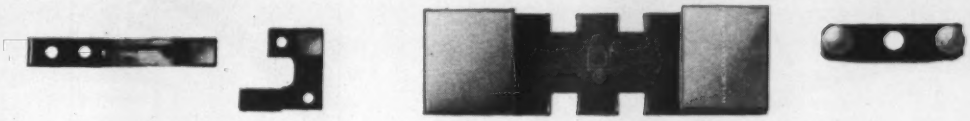
TRADEMARK

PRECISION® Quarterly NUMBER 8

PRECISION WELDER AND FLEXOPRESS CORPORATION, 3520 Ibsen, Cincinnati 9, Ohio



Automated Welding Sure Way To Electrical Contact Economies



CHICAGO: Step into a progressive metalworking plant near here and you will find a line of 60 resistance welding machines fastening buttons.

Each month this one plant welds millions of electrical contact buttons to other electrical components. These buttons must be superior electrical conductors (which is why so many are made of fine silver), and above all, they must be reliable. This plant is achieving button-welding reliability of 999,996 perfect parts out of each million welded!

With understandable pride, we note that most of the machines in that reliable line are Magnetic Force welders built by Precision Welder & Flexopress Corp. of Cincinnati, Ohio. Precision is an old hand at reliable button welding.

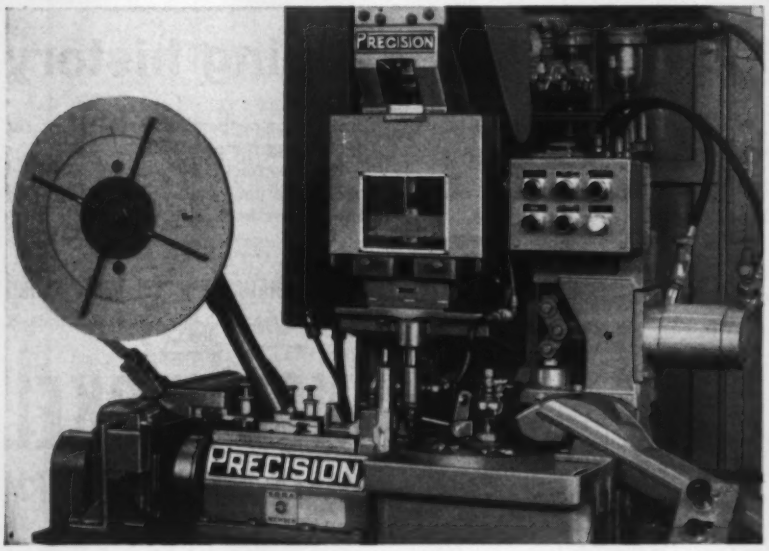
It's a big business, too. Your doorbell, thermostat, dishwasher, drier, toaster, waffle iron, telephone, and automobile would soon break down without reliable contacts. Industrial equipment is loaded with them.

Button welding can be tricky. Besides being difficult to weld directly to other materials, silver is costly. If you decrease the amount of silver and increase weldability by using contacts in which the silver is backed up with other metals, you often end up by increasing costs. However, a good proportion of our country's electrical manufacturing plants find that individual contacts of composite materials make sense for low volume production. Standard resistance welding machines can handle the work—whether welding, brazing, or silver soldering—on a slowpoke basis.

But when it comes to thousands of contacts a month, only welding automation (the kind pioneered by Precision) can really hold costs down. Contacts no longer have to be purchased ready-formed. Automated Precision Welders accept coiled ribbons of pure silver or composite materials, accurately measure and cut off contact blanks, orient them, assemble them to other components, weld the two together automatically, and coin to shape. Ingenious tooling can equip the same Precision machines to handle components of many different sizes and shapes.

In addition, Precision furnishes the electrical industry with Magnetic Force welders with hopper, magazine, dial, and in-line feeds for handling ready-formed contact buttons. You will also find Precision welders (and Flexopresses, too) doing the unusual and difficult jobs in automobile, appliance, communications, aircraft and many other metalworking categories.

If yours is a high-production welding task, or if it involves the welding of precious metals, dissimilar materials, large areas, or other out-of-the-ordinary situations, you ought to look into Precision. Especially if it's profits you're after. And who isn't?



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CEdar 7-8560

Fred Merchant
Philadelphia, Pa.
TUrner 4-7035

Production Eng. Sales Co.
Dayton, Ohio
CRestview 8-4741

G. E. Schmidt, Inc.
Cincinnati, Ohio
MElrose 1-6166

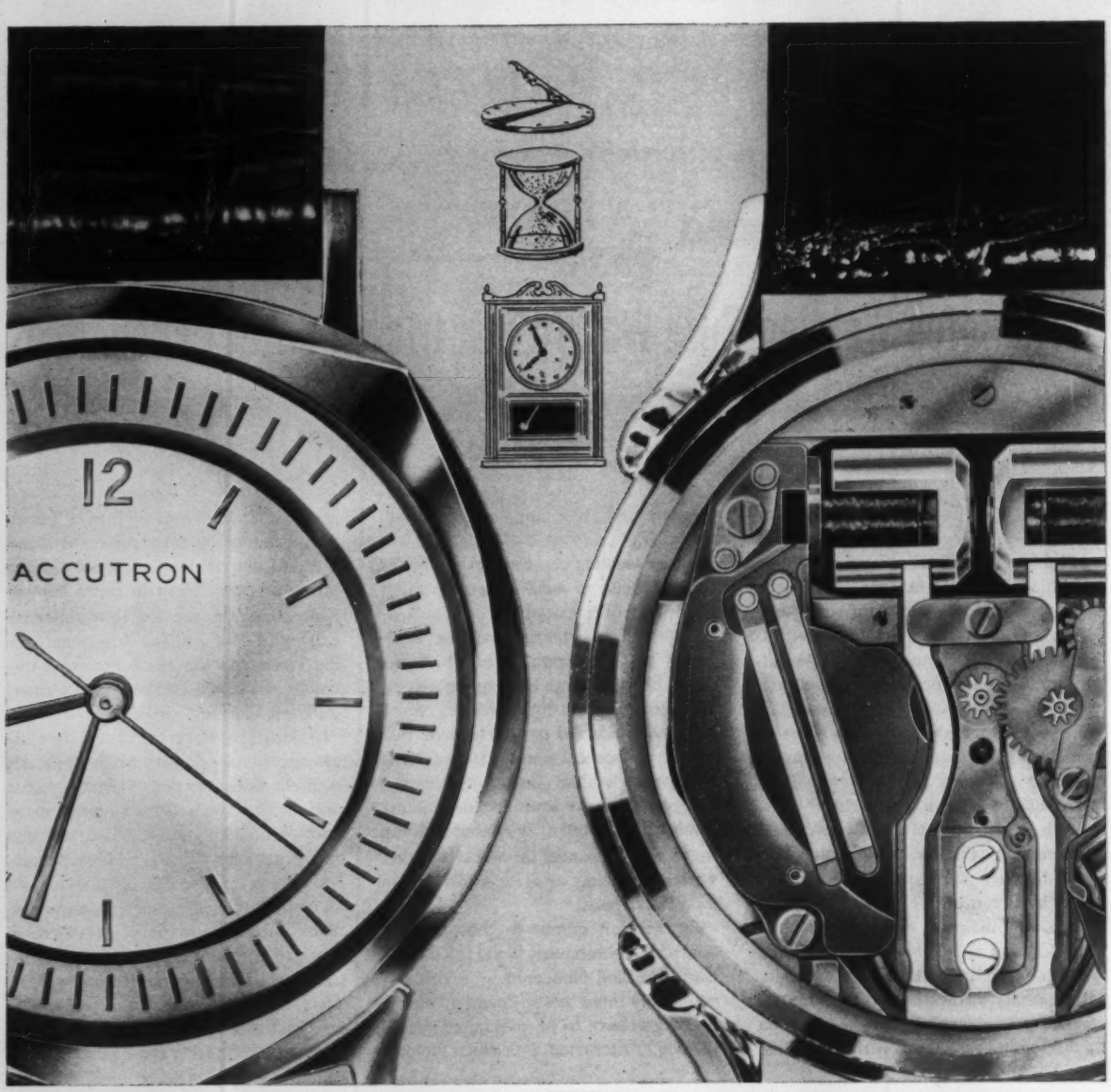
Victor Equipment Co.
Los Angeles, Calif.
LU 5-1286

Weber Welding Supply Co.
Pittsburgh, Pa.
MAyflower 1-5230

Zimmerman & Gaumond Inc.
Chicago, Ill.
TAlcott 3-5191

Zucker Engineering Co.
Detroit, Mich.
TR 5-5300

Precision Welder & Flexopress (Can.) Ltd.
Toronto, Ont. PL 9-1138



How Nickel helps make timekeeping history

Electronic tuning fork made of a Nickel alloy represents the most basic advance in personal timekeeping in 300 years

A watch you don't need to wind. A watch without mainspring, balance wheel, or hairspring. A watch that doesn't gain or lose more than 2 seconds out of every 86,400!

The secret of the fantastic timekeeping accuracy of Accutron* is a precision tuning fork that vibrates more than 31 million times every twenty-four hours—day after day, week after week, month after month...powered by a button-size battery.

To assure the faultless, electronic measurement of time, the tuning fork's incessant vibration must remain constant under a wide range of temperatures and all sorts of shock and impact that can occur in day-to-day watch wear.

That's why electronic engineers chose Ni-Span-C† alloy (42% Nickel) for the heart of this space-age marvel. This high Nickel alloy maintains the fork's vital stiffness at temperatures from 0° to 150° F...fights off damaging corrosion and oxidation.

Just as Nickel helps give this watch's mechanism exceptional reliability, so too Nickel can increase the reliability of hundreds of alloys under many severe conditions—great heat, cold, corrosion, or stress. Alone, or with other elements, Nickel gives alloys the combination of properties to meet the most demanding metals needs.

Perhaps Nickel or a Nickel alloy can help solve your metal problem. To find out, just write to Inco.

*Bulova Watch Company, Inc. trademark.
†Registered trademark, Inco.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

INCO NICKEL

MAKES ALLOYS PERFORM BETTER LONGER

Lost: One Sale

When the 1962 autos were being previewed last August, we were attracted by a rather sporty new model. We decided to buy. We wanted the car for some trips during the bright autumn days, including a visit with our son at college.

We asked an official of the manufacturer about probable delivery dates. He confessed uncertainty. He feared production of 1962 models would be interrupted and delayed by plant-by-plant bargaining on work practices—even after an agreement was reached on economic issues. He doubted that we could get the model we wanted in time for the autumn season.

Problems like this one had to be ironed out. At one plant, the company uses boxcars for in-transit warehousing. A crew of 200 loads and unloads the cars. At another plant, parts are unloaded from cars, taken to a warehouse, then reloaded and shipped as needed. The double handling at the second plant requires 400 loaders. Union officials at the first plant wanted its loading crew to be as big as the one at the second plant, even though only half as much handling was involved.

At another plant, the company invested huge sums in more efficient equipment which increased productivity substantially. Local union officials insisted that incentive rates should not be changed even though the company's investment represented a windfall to the workers.

Getting back to the man we talked to about a new car. His fears were well founded. By mid-October, this nation had lost the production of nearly a quarter million cars.

We did not order the new car. We wanted it for the fall season. We did not want to take delivery in the dead of winter, with its ice and snow, slush, and salt.

A neighbor had a similar experience. He had narrowed his choice to a U. S. compact and a German-built car. When strikes hit the U. S. plants, he bought the foreign auto.

Now both of us are speculating on how many 1962 auto sales are being lost because of the fall strikes. We are wondering how many tons of steel will not be sold and how many people are out of work at partmaker and supplier plants because of the crimp in production.

We are wondering whether the auto industry will wind up with just a good production and sales year. Before the crippling start, its prospects were better than good. We are wondering about the effect of the auto slowdowns on an economy that's just beginning to feel a substantial upturn.

And we're wondering why Senator Gore isn't making a speech about it and why President Kennedy isn't writing some letters.

Walter J. Campbell

EDITOR

HOW BOYERTOWN KEEPS EVERY BODY HAPPY

Boyertown Auto Body Works of Boyertown, Pennsylvania is keeping delivery truck owners, drivers and maintenance men especially happy these days by using a new, all-around material in its body construction: J&L Nickel-Copper-Titanium high-strength forming steel.

The owner is pleased because lighter weight means lower operating cost. And Boyertown has been able to save from 600 to 650 pounds over mild steel in a 12-foot forward control delivery body—with no sacrifice of strength!

The driver is satisfied because the increased ductility of J&L Nickel-Copper-Titanium makes it possible for Boyertown to design bodies with greater flexibility—provide more convenience and safety for the man behind the wheel.

The maintenance man is happiest of all. J&L Nickel-Copper-Titanium has a minimum of 4 times the corrosion resistance of mild steel. (For extra protection, Boyertown coats it with rust-inhibiting zinc chromate). It has greater abrasive and impact resistance, and less tendency to dent and wear.

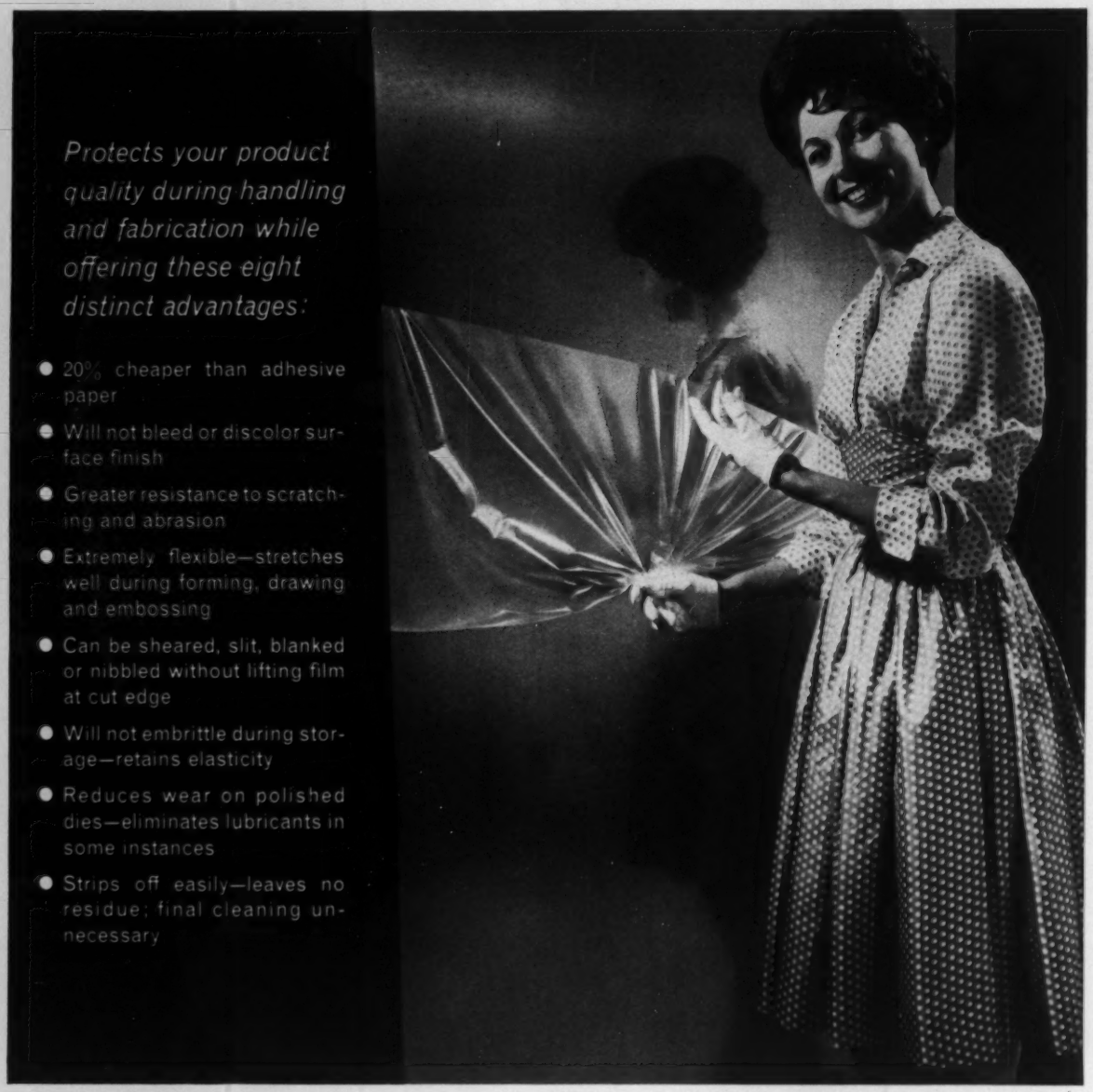
When maintenance is necessary, dents can be easily "bumped out," and repairs are quick and inexpensive.

That's why Boyertown—a pioneer in the use of high-strength steel—continues to specify J&L Nickel-Copper-Titanium for its exterior and interior truck panels, posts, ribs, cross members, floors, doors and windshield assembly. Ask your J&L salesman about J&L's other new high-strength steels, JLX-W Columbium-Bearing and J&L "Cor-Ten."

Jones & Laughlin Steel Corporation
3 Gateway Center, Pittsburgh 30, Pennsylvania

J&L STEEL

New strippable plastic film for protection of stainless steel surfaces



Protects your product quality during handling and fabrication while offering these eight distinct advantages:

- 20% cheaper than adhesive paper
- Will not bleed or discolor surface finish
- Greater resistance to scratching and abrasion
- Extremely flexible—stretches well during forming, drawing and embossing
- Can be sheared, slit, blanked or nibbled without lifting film at cut edge
- Will not embrittle during storage—retains elasticity
- Reduces wear on polished dies—eliminates lubricants in some instances
- Strips off easily—leaves no residue; final cleaning unnecessary

You get greater protection *plus* economy with the new in-fab plastic coating now being applied to MicroRold® stainless steel sheet, cut strip, and coiled sheet and strip. The semi-transparent protective film is 20% lower in cost than regular adhesive paper and offers more versatility in fabrication. The protective film is applied at our mill on customer order only, and is available on stainless steel in gages from .018″ to .050″ in widths up to 42″. It is guaranteed to strip off in one piece by loosening with fingernail at any corner.

Strippable plastic protection is intended as a safeguard only during ordinary handling, storage and fabrication—*not* as a barrier for weather, water damage, undue abrasion, impact or foreign substance. Once removed it will not adhere again.

Want more information or a test sample? Write to Product Development Dept., Washington Steel Corporation, 10-O Woodland Ave., Washington, Pa.

WASHINGTON STEEL CORPORATION

Woodland Avenue
Washington, Pa.

AF Seeks Better Contract Performance

The Air Force and its deputy chief of staff, materiel, Lt. Gen. Mark E. Bradley Jr., are out to get more value for their dollars by . . .

1. **Increasing competitive buying.**
2. **Obtaining more reliable cost estimates.**
3. **Paying more attention to specifications, tolerances, and engineering changes.**

PROFITS OF EFFICIENT defense contractors should improve as the Air Force pushes its program to reward outstanding work and penalize bad work.

The Air Force is negotiating with several firms to set up performance goals which will permit incentive profits of up to 15 per cent for research and development contracts and 10 per cent on production contracts. Previous policy restricted profits in both categories to about 9 per cent on cost-plus-incentive fee contracts.

• **Rules**—Maj. Gen. William T. Thurman, director of procurement management, reports fees will be increased for extraordinary performance where: 1. Cost targets are realistic. 2. Gains are worthy of additional payment. 3. Potential gains are coupled with correspondingly severe penalties for poor work. 4. Reasonable standards for the measurement of gains or penalties are established.

Penalties will be established up to the full amount of the fee, perhaps more in some cases.

Air Force sources emphasize that the need for cost reduction is a "normal part of contract management." Every major contractor is required to report on the success of its cost cutting techniques by November. "The primes are on the hook to cut costs, and one of the major ways they can do it is to make their own subcontracting more competitive by seeking more sources," notes a colonel in the Pentagon. He emphasizes that 15 cent profit awards will be rare: "Mediocre performance will be worth only 6 per cent; good work will be worth 8 to 9 per cent; really excellent work will be needed to raise your profits higher."

The Air Force is the first of the services to adopt the "incentives for efficiency" program which has been pushed by Defense Secretary Robert S. McNamara. It follows last year's emphasis on cost cutting in the Air

Air Force Hardware Budget

(Millions of direct obligations, fiscal years)

Procurement Accounts	1960	1961	1962
Aircraft Procurement . .	$2,927	$4,228	$3,564
Airlift Modernization . .	*	232	409
Missile Procurement . . .	2,432	3,017	2,810
Ammunition, Communications & Miscellaneous Procurement .	731	1,023	1,168
Research, Development, Test & Evaluation . . .	1,392	1,761	1,943
Total Procurement & Research	$7,482	$10,261	$9,894

*Airlift modernization account was not used until fiscal 1961.
Editor's Note: Congress added about $700 million to the Defense Department's Air Force requests for bomber production and speedups in the B-70 and DynaSoar development programs. That money is not included in the above tabulation because it does not appear that the Pentagon will spend it this fiscal year.

Force which proved successful (see STEEL, Oct. 16, p. 78).

• **The Orders**—In June, Air Force procurement and research commands got a 16 point list of "musts" for improving procurement management. Here are the major ones:

1. Increase competitive buying, whether procurement is through advertising or negotiation. When a sole source procurement is absolutely necessary, competition must be secured on the next procurement if feasible. Where large contracts are awarded, competition is to be secured at the subcontractor level. Subcontractor competition is to be secured through advertising where practicable, avoiding "captive" organizations of the prime.

2. Obtain reliable cost estimates. Too often, the General Accounting Office checks have shown contractor cost estimates are incorrect—they may be based on illusory data which are incomplete, overoptimistic, or "sloppy."

3. Specifications, tolerances, standards, and engineering changes must be considered in relation to the capability of the weapon system. They must be "reasonable" in the sense that the high cost of close tolerances must provide valuable increased capability.

• **Attitudes**—To be effective, the program must be felt from a company's top management down to the design engineer who specifies a $5 widgit instead of a $6 gadget, knowing that the extra cost of the gadget would not be justified in terms of proportionately increased operating effectiveness.

Make or buy decisions by the primes will be monitored more closely than ever by the Air Force. All contracts now include a clause requiring that any change in the make or buy structure must be reported to the service with the necessary cost adjustments. Many primes, understanding the Air Force's seriousness of purpose, are conducting seminars with their subs to set up guidelines for cost reductions. The Air Force, in turn, is asking that it be kept informed of costing techniques, so it may feed new procedures to all the primes.

There is some talk of returning to the old "E" award used in wartime. Assistant Secretary for Materiel Joseph H. Imirie sums up the problem: "We are on the verge of pricing ourselves out of the ability to have the arsenal of weapons we need." The best payoff for the cost conscious Air Force contractor is the follow-on business to the original contract, plus recognition of capability, so that new bids on new programs receive special attention. Contractors who make a living by bidding low, then overrunning target costs may never get another chance to prove themselves as competent Air Force suppliers, procurement officers warn.

The recent $15 million contract for M-14 rifles to Thompson Ramo Wooldridge Inc. illustrates the change in procurement policy. Thompson will get a bonus if the rifles are produced ahead of sched-

ule, but will draw a penalty if they're late.

• **Expanding Market** — The Air Force's rising hardware budget makes the contractor's efforts to meet cost reduction criteria significant. Obligations in fiscal 1961 and 1962 are about 35 per cent above those of the fiscal 1960 budget (see table). Here are programs developing which alert subcontractors will be participating in:

• **Tactical Fighter**—About $60 million has been allocated for the development of a new tactical fighter (TFX) to be used by the Air Force and the Navy. It will be capable of taking off from aircraft carriers and relatively small airfields. The Air Force managed program will require at least another $275 million for development. With both services procuring it, orders should be large enough to keep the cost of each plane to $2.7 million, including research, ground support equipment, and spare parts. Enthusiasts claim the joint development and procurement effort will save the taxpayer $1 billion. The Air Force will be requesting bids soon; the contract should be awarded early in 1962.

• **VTOL**—The Air Force is managing the Army-Navy-Air Force program to produce an experimental VTOL (vertical take-off-and-landing) transport. Chance Vought, Hiller, and Ryan compose the prime contractor team. More than $70 million will be spent to produce five prototypes. Special Navy requirements for carriers will probably be cranked into the program later, raising the cost to $100 million or more.

• **Dromedary**—This program for a stand-off bomber is, in a sense, the Air Force's answer to the Navy's Polaris concept—a missile firing vehicle capable of staying aloft for days. Two B-66 aircraft are being modified to demonstrate a new flight technique (boundary layer control) which decreases drag significantly, allowing flights of several days' duration.

• **Airlift**—Mr. McNamara's attention to limited war problems has not missed the Air Force. A $1 billion Lockheed program for mass production of the C-141 transport is well underway. The C-141 will be capable of delivering 50,000 lb (troops and equipment) across the Atlantic, or 20,000 lb across the Pacific.

• **Space Efforts**—The Air Force carries well over 90 per cent of the armed forces' effort in space. The latest decision is to give it the solid fuel booster program for the Nova moon rocket in competition with the National Aeronautics & Space Administration's (NASA) liquid fuel program. The project begins this year with a budget of $62 million, including $12 million to start building a test facility. Perhaps $500 million will be spent on solid fuels for large boosters (including $100 million for facilities) before a decision on the engine is reached. That time is at least three years away. If the solid booster wins the competition, the program will run at least $2 billion. The booster contemplated will have 2 million to 3 million lb of thrust. It could put a man on the moon before the end of the decade.

Three highly classified programs promise to grow larger in the years ahead. The Samos project (a reconnaissance satellite) has a budget of around $275 million for fiscal 1962, about the same level as last year. The budget for the Saint project (a satellite system designed to inspect potentially offensive satellites) has been increased five times this year to a level of $26 million. The Midas project (an infrared detection system for ballistic missiles) has had its budget doubled this year to $201 million.

• **Minuteman**—As all signs indicate a phase out of the bomber and increased reliance on missiles and satellites for strategic defense, there appears little doubt about the Air Force's intent to keep pushing the solid fueled Minuteman. This year's budget includes $377 million for the bird, excluding construction of hard launch sites. One aspect of the program remains in doubt: The mobile Minuteman to be launched from railroad cars. Secretary McNamara cut out production money for it but continued research spending.

• **B-70** — The biggest question for all Air Force contractors: Will the Mach 3, B-70 program ever result in an operational bomber? Congress added money to the Air Force's $218 million program for this year, but Secretary McNamara appears hesitant about committing himself to an operational system. Planned now: Three prototypes, the first to fly in December, 1962, and development of the bomb-navigation system. Total cost of that program will be $1.3 billion. An operational weapon system would cost another $1.4 billion and could be ready by 1967.

• **Skybolt**—In connection with the bomber vs. ICBM argument, don't overlook the Air Force's ability to equip its bombers with long range missiles. Skybolt, to be launched from the B-52, is scheduled to be operational within a few years—1964 to 1970. Each bomber will carry four birds. Spending runs about $100 million a year. The B-70 is not designed to carry the Skybolt. If the B-70 should get the green light, another missile would probably be developed; there's a possibility the B-70 could be used as a flying satellite launcher too.

• **DynaSoar**—This orbiting aircraft concept has reportedly had its ups and downs in development; materials problems are considerable. Congress this year added $86 million to the Air Force's $100 million budget in an attempt to get the project finished soon. So far, the money has not been utilized.

GROWING OPPORTUNITIES IN DEFENSE . . . No. 4

This is the last in a series of articles outlining metalworking's growing opportunities in the defense market. Extra copies of this and the other articles in the series will be available until the supply is exhausted. Write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

Other articles and their dates: What the Space Program Means to You, Aug. 21; New Army Offers New Markets, Sept. 11; Navy Becomes Bigger Customer, Oct. 2.

"Developing countries want powerplants and steel mills," says William E. Knox, president, Westinghouse International. "They don't want the bits and pieces; they want a complete, guaranteed plant. In this approach we introduce American machinery, American methods, American standards, and American people to the foreign country."

Selling a 'Package' Overseas

WHETHER Westinghouse Electric International Co. is planning a multimillion dollar power and steel complex overseas or simply offering technical assistance to a small foreign company through a licensing arrangement, hundreds of other U. S. firms also benefit.

The spin-off takes two forms:

1. When Westinghouse International (WI) takes the lead in a large "package" deal, it can mean business for as many as 150 U. S. companies.

2. In providing design and production knowhow to companies abroad, WI is maintaining and expanding the area in which the U. S. industrial approach can be promoted.

During World War II years, WI found it necessary to adopt the project approach of doing business overseas. European businessmen bought items like powerplants and steel mills in a complete package (including all engineering and design) from the U. S. All parts were guaranteed by the seller. A typical order (this one from Venezuela) is cited by William E. Knox, president of WI: "Send us one powerplant, complete with whistle."

• **How Teams Form**—WI is usually the prime mover in large projects. Companies in a group vary. "We're interested in putting companies together that are going to have some strength," says Robert L. Jeans, vice president-marketing. "In this way, we're offering the customer something he can't get elsewhere. When we become the prime contractor, we take the responsibility for the over-all package and its price.

"Our main philosophy: Cover our costs and make our profit in the sale of our own products."

• **Impact** — Mr. Knox underscores the values to the U. S. in this marketing approach. "When we sell a complete powerplant or steel mill, we introduce American machinery, American methods, American standards, and American people to the foreign country. It's this person-to-person contact that means so much."

Rather than make outright loans to other countries or co-operate with several foreign nations on industrial projects overseas, Mr. Knox prefers all-American projects. "I like to see Uncle Sam do a complete job. We can take pride in the job. The people of the foreign country can then say 'look what the Americans have done here.' At the same time, other advanced countries—Great Britain, France, Italy, West Germany, and Japan—can carry out their own industrial projects."

• **Case History**—Take the $245 million iron and steel project at Eregli, Turkey: WI joined with Koppers Co. Inc. and Blaw-Knox Co. in the design, general engineering, and construction supervision of the plant on the Black Sea.

The three companies formed Koppers Associates. It and leading industrialists in Turkey own the plant. Shares will also be offered to investors here and in Turkey. Initial plant output is estimated at 470,000 tons of ingots annually; ultimate expansion may boost it above 1 million tons.

The project is financed by a $130 million loan from the Development Loan Fund. Chase International Investment Corp. is also participating in the equity financing. Our government insisted that the Eregli plant be privately controlled. The arrangement demonstrates the advantages of the free enterprise system to Turkey, points out David L. Maxcy, director-Projects Div., WI.

• **Quality Guaranteed**—To guarantee U. S. quality, the planners insist on U. S.-made electrical controls, drives, certain machinery, instruments, and other components. Structural steels and simple heavy equipment are often purchased in the participating country, or from other foreign suppliers.

Orders placed in the U. S. for such things as heat treating furnaces, soaking pits, and shears have important effects for manufacturers of steel mill components, Mr. Maxcy points out. He adds: "When utilities are not expanding in this country, or there is no major steel mill expansion, orders like the Turkey project take up the slack for those that produce powerhouse equipment, controls, distribution equipment and for process lines, rolling mill and steel mill equipment. International business helps to level out the peaks and valleys of domestic business."

• **Competition** — Competition for overseas business on a project basis is keen—from other company groups in the U. S. and from industrial nations like West Germany, England, and Japan. U. S. technology and designs have kept this country in the lead, Mr. Jeans says.

Of course, plenty of time and dollars go into surveys and studies in developing countries before a big job is landed. Mr. Jeans stresses the importance of having private companies rather than our government carry out feasibility studies. "On a project basis, we can be more specific," he says. "A definite goal is necessary. We've just completed a complicated electric power study for South Korea along with an engineering company. We expect to get an order from it."

To meet world competition on power and industrial projects, WI frequently offers the customer apparatus and engineering services, plus assistance in obtaining financing, which cannot be matched by European manufacturers.

The Projects Div. assumes prime responsibility for the planning and supply of apparatus, materials, and services for power and industrial projects.

• **The Organization**—WI markets the entire line of Westinghouse products in 148 countries outside the U. S., and it sells to machinery manufacturers in the U. S. for resale overseas. The organization includes the Westinghouse Electric International Co., which has headquarters in New York and offices in East Pittsburgh and South Philadelphia, Pa., San Francisco, and Washington, and two overseas companies

Robert L. Jeans, vice president-marketing, tells how . . .

Westinghouse Can Help You Sell Abroad

- **Provides Marketing Assistance—Since Westinghouse International is in contact with every major market in the Free World, it can bring to your attention specific sales opportunities.**
- **Gives Current Marketing Information—Through its overseas offices and world-wide distributor organization, the company can offer up-to-date information on foreign specifications, import controls, financial and economic conditions, and political developments.**
- **Helps with Negotiations—Westinghouse field personnel can provide introductions overseas to appropriate people with buying influence.**
- **Offers Information on Overseas Projects—The company can provide over-all design, machinery specifications, status of development, construction and delivery schedules, and packaging and shipping requirements.**
- **Assists with Export Requirements—The company can help you to obtain import licenses that meet custom controls and help you with monetary exchange.**

with 28 offices in principal cities throughout the world.

The sales and engineering specialists are divided into three basic groups. One group has responsibility for maintaining liaison with manufacturing divisions of Westinghouse to keep abreast of new product developments. Another has market area responsibility, with each member keeping in close touch with marketing conditions in other countries. The third, working closely with the other two, has responsibility for sales to U. S. machinery manufacturers for resale overseas.

• **Overseas Experts**—For on the spot coverage, Westinghouse has more than 150 sales, engineering, and other specialists assigned to its overseas companies. They work hand in hand with more than 350 Westinghouse distributors covering every major country of the Free World.

• **U. S. Doctrine Spread** — "In licensing new manufacturing undertakings in Mexico, Brazil, Argentina, India, and Western Europe," says Mr. Jeans, "we have an opportunity to spread the gospel of U. S. methods and standards.

"It is accomplished through the Engineering Planning Dept. of our Associated Companies Div., which develops for the licensee model operating statements for a five year period, and provides detailed layouts and recommendations on equipment purchases.

"Thus, from the beginning, the newer licensees have acquired the more strategic portions of their production facilities from U. S. industry." Thus we are laying the groundwork for continued use of U. S. tools.

• **U. S. Attitude**—Mr. Knox believes he sees some new thinking in Washington regarding foreign aid. He puts it this way: "I think the tendency in Washington is to go to the developing country and ask: 'What are your plans for the next five years?' We then try to get the industrial countries to get in and help finance the projects. I'd like to see more clearcut responsibility. Rather than mix each job, I'd be much happier if each country took certain jobs. In this manner, we would have real competition between supplying countries."

October Auto Sales Near Record Pace

DETROIT is acting like sales approaching 1955's are in sight, despite automotive labor troubles which have cost the industry nearly 250,000 assemblies.

Producers are building cars at a rate of 35,000 daily and selling them at a 20,000 a day clip. Dealers have a scant 30 day supply of new models on hand. The first ten days in October saw sales zoom to 167,000 units, second best score for that period in history and slightly higher than the first ten days of October, 1955.

• **Recouping Doubtful** — However, the strikes undoubtedly caused sales losses in September, and it's doubtful if the industry can make up all of the assembly curtailments this year. (See Pages 25 and 87.)

If present trends continue, the industry will turn out 640,000 cars in October. Sales should climb above 650,000 units since there are more selling days than production days in a month. As of Oct. 21, 840,155 new models had been produced. So it all adds up to a near record fourth quarter. Previous production records for the October-December period were 1.9 million cars in 1955 and 1.7 million in 1960.

• **Progress Reports**—Auto companies are enthusiastic about October's prospects. Rambler says the first ten days were the highest in its history for that period. Lark sales are running 82 per cent ahead of last year's. Chrysler is claiming the best sales period since August, 1957. Lincoln sales are best for the first ten days of any month in the last four years.

• **Uncertainties** — Compacts have slipped to 35 per cent of deliveries from a third quarter peak of 37 to 38 per cent. That makes cautious marketers hint that the compact surge may have hit its peak. *Ward's Automotive Reports* predicts that sales of compacts in the $2000 to $2600 bracket will hold the key to aspirations for a 7 million unit sales year.

Metal Show:

YOU'RE NOT ALONE if you're wondering how to meet the challenges of today's changing technology. At last week's Metal Show, in Cobo Hall, Detroit, scientists and manufacturers were looking at new problems and demonstrating new answers. In the offing:

• Stronger, more ductile metals (and nonmetals such as ceramics) stemming from better knowledge of crystal structure and the effects of trace impurities.

• Production use of methods once restricted to the laboratory.

• Closer controls on measurements —such as dimensions, composition.

• More automation in all stages of production—from primary metal production to heat treating and packaging.

Development of high purity metals is contributing much to our knowledge and use of metals. W. G. Pfann, Bell Telephone Laboratories, pointed out in a technical session that the list of 99.999 per cent pure metals is growing.

Even the meaning of purity is changing. Emphasis is shifting from the purity of the metal to the

Progress Put on Display

amount of impurities (measured in parts per billion). Take semiconductors. Traces of impurities cause sharp changes in their electrical properties.

Says Mr. Pfann: Methods needed to work in producing high purity metals are delicate, high powered, and expensive. But progress being made is important because minute amounts of impurities can interfere with or prevent advances in the fundamental understanding of metals.

• **Spotlight on Vacuums**—Vacuum processing of metals—for heat treatment, not metal manufacture—attracted a standing-room-only audience. It was stated that costs for vacuum heat treatment were down to a point where equipment would pay for itself in savings on some jobs. One advantage cited by a user of a cold wall type furnace: "I don't have to wait for an atmosphere adjustment after the furnace comes to temperature; it's ready to go to work as soon as I turn it on."

• **Card Control Extended**—A punch card system for quality control in heat treating was one of the stars at the show. Introduced by Lindberg Engineering Co., Chicago, the system is known as the Lindberg Robotrol. It sets pyrometers, atmosphere control instruments, and timers, and governs other factors concerned with metallurgical results. When work arrives at the heat treating furnace, the operator places a punched card in a slot on the panel. The card controls furnace operation and accurately applies correct specifications for all the metallurgical factors required. Furnace operator errors are eliminated. The punch card provides an accurate record of the treatment.

• **New Furnace**—A unique production concept for rotary retort carburizing of small parts was presented by the Furnace Div. of Joe Martin Co. Inc., Detroit. Its automatic, Duo-Drive furnace has separate and independent drives for shuffle action and tumbling.

Baird-Atomic Inc., Cambridge, Mass., claimed a scientific breakthrough with a Kopito furnace for the demonstration of high temperature phenomenons. Temperatures in excess of 6000° F are reached within seconds through controlled electrical currents passing through graphite cloth heating elements. A highly efficient water cooling system reduces furnace temperature to a harmless level within 2 minutes after operation.

• **Up to 6000° F** — Arcweld Mfg. Co., Grove City, Pa., unveiled integrated equipment for the testing of exotic metals under extreme conditions—temperature, vacuum and stress of missile blastoff, flight, and re-entry. Included were two new furnaces which produce temperatures up to 6000° F. One uses molybdenum, tantalum, or tungsten heating elements; the other employs electron guns to bombard and heat test samples.

Another application of the electron beam was in a welding machine introduced by Hamilton Standard Div., Windsor Locks, Conn., of United Aircraft Corp. Its Hamilton-Zeiss electron beam welding machine incorporates several major modifications of the original model, which was developed by the Carl Zeiss Foundation in West Germany. The machine handles any fusing, melting, or welding operation when extreme precision is required, where dissimilar materials must be joined, or where previously unweldable materials are involved.

• **New Friction Welder**—The show gave the public its first look at the new production welding machine made by American Machine & Foundry Co., New York. AMF says that for many types of welds, the friction method is more efficient than conventional means and requires less power.

A rotary drum degreaser for automated production lines was introduced by Metalwash Machinery Corp., Elizabeth, N. J. To clean small parts, the degreaser is designed for nonstop work without an attendant.

A resonant electromagnetic system produces shaking forces up to 50 G in the new, 6 cu ft capacity, vibratory finishing machine shown by Vibrodyne Div., Globe Industries Inc., Dayton, Ohio. The machine has only one moving part—the tub.

New Aids for Business Forecasters

How '63 Could Shape Up With Full Employment

	(Billions—current dollars) 1961*	1963
Gross National Product	$516.1	$620.0
Durable Goods Expenditures	42.0	54.5
Government Purchases	107.3	126.0
Residential Construction	20.6	28.0
Other Construction & Producers' Durable Equipment	45.4	64.0
Disposable Personal Income	361.8	422.0
Corporate Profits & Inventory Valuation Adjustment	45.5	62.0
Unemployed (millions of persons)	4.9	3.0
Durable Goods Employment	9.0	10.7
Industrial Production Index (1957=100)	108.1	134.0

*Seasonally adjusted in second quarter.

FOUR COMPUTERS and eight staffmen at the Census Bureau are putting a new look on government forecasting of the business cycle.

At the White House, the President's Council of Economic Advisers (CEA) is attempting to estimate what the U. S. economy would look like if we could achieve full employment by the end of 1963. ("Full" employment, as envisioned by the CEA, is 3 million unemployed, as the Labor Department counts heads.)

CEA Chairman Walter Heller is dealing with the long range outlook for the economy. He describes his study as "tentative" and requests advice from businessmen.

● **CEA "PERSPECTIVE"**—The council, which has achieved a policy forming function in the Kennedy administration, offers its figures as guidelines for private forecasts. It hopes that businessmen will see fit to send their estimates to Mr. Heller. If you care to respond, send data such as: 1. Firm name, kind of business, and Standard Industrial Classification number. 2. Your sales from 1959 through 1961, and your forecast for 1963. 3. The percentage of capacity at which you operated the same years. 4. Persons employed (average per year), manhours worked, and inventories appropriate for those operations. 5. Profits, dividends, outlays for plant and equipment (break down expansion and modernization outlays), and depreciation allowances.

The CEA emphasizes that its figures for 1963 are in no way a forecast; rather, they represent what could happen if we should achieve "full" employment.

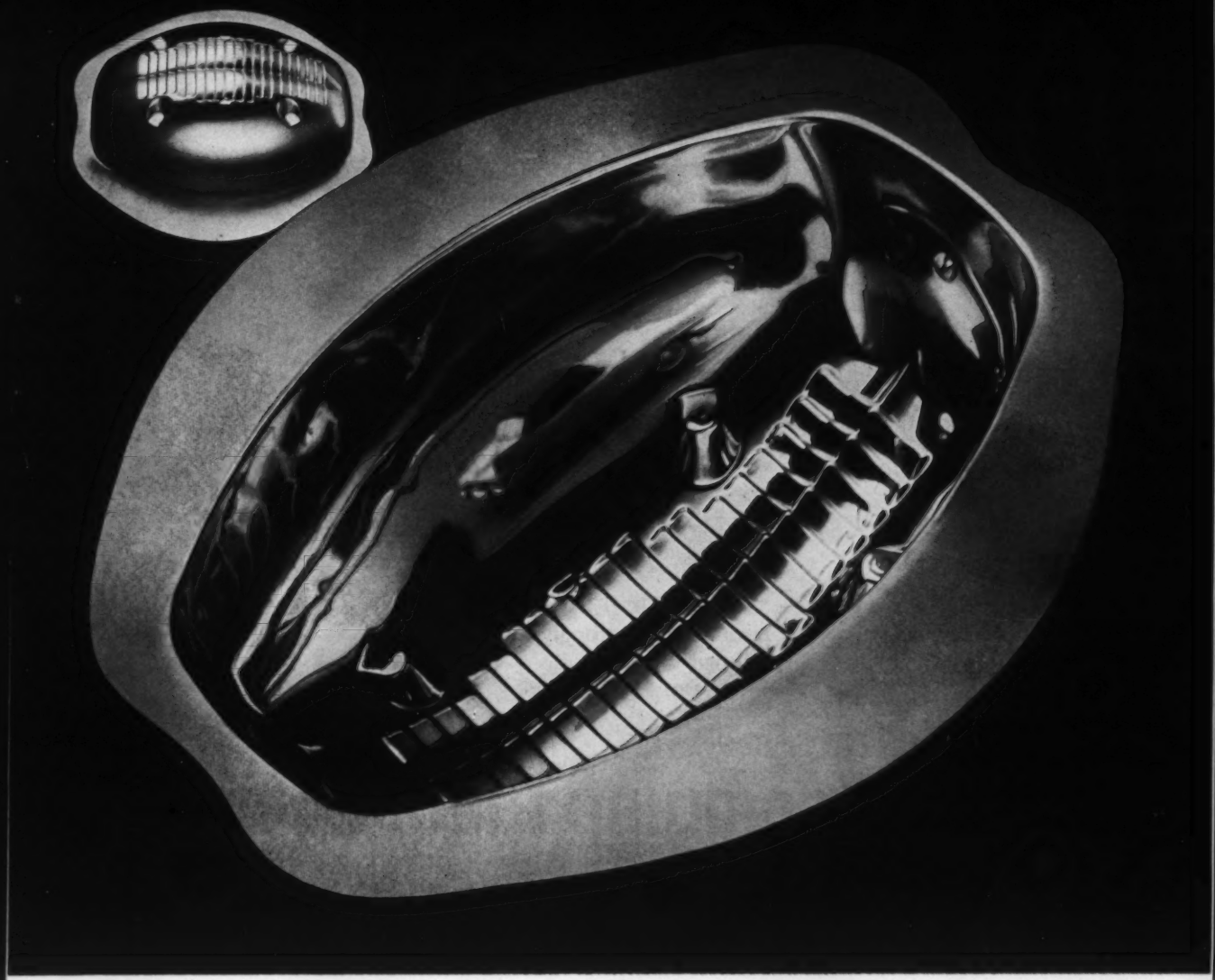
● **HOW TO GET REPORTS**—Commerce Secretary Luther Hodges has already been using some of the Census Bureau's new figures. He told reporters last week that his department's publication, *Business Cycle Developments*, will be issued about the 20th of each month. Businessmen interested in receiving copies may subscribe by writing to the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Enclose a $4 check for a one year domestic subscription, a $5 one for a foreign subscription. A sample copy is available at your local Commerce Department office.

Julius Shiskin, chief economic statistician of the Census Bureau, is principally responsible for Commerce's new publication. Secretary Hodges warns that the figures (70 principal indicators) will not provide any sort of an automatic forecast, but he does believe that businessmen and economists who use them will find "guideposts."

Mr. Shiskin cites a new series of figures (developed by him, in co-operation with the National Bureau of Economic Research), which show the ratios of manufacturers' prices to unit labor costs. He thinks the index provides a good estimate of future corporate profits, noting that it has tended to lead actual profits by a month or two. The index is one which should be of particular interest to metalworkers. It dipped in the last month, for example, showing a result of the Detroit strikes a couple of months before the profit figures for all industry were in.

The new figures may better prepare you for sudden inventory trends, unexpected price cuts in basic industries, or quick spurts in consumer buying, say the experts at Census and Commerce.

● **FUTURE MODIFICATIONS**—It now appears that the theoretical economists have firmly established their positions in the Kennedy administration. The council is being consulted on matters which never reached its attention until after the fact under President Eisenhower, and the Census Bureau has come up with an aid to forecasting. Watch for a new productivity index from Census, Bureau of Labor Statistics, and Commerce; expect the White House to do a great deal more over-all planning on the basis of the new studies.



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"We have new railroad car steels that can be justified economically."

U. S. Steel Corp.'s **R. W. Claypoole,** manager of railroad products (left), and **H. J. Mullin,** vice president-sales.

"The time is right for aluminum to move strongly into the railroad market."

Alcoa's **James A. Burt,** manager of railroad sales.

Materials Battle Looms In the . . . Changing

THE RAILROAD equipment market is a big one—as the chart on the opposite page indicates.

The clash between proponents of steel and aluminum rolling stock benefits the roads in their efforts to boost revenues via increasing train speeds, length of runs, and better equipment utilization.

"Railroads last year turned out 200 billion more ton-miles of freight service with 335,000 fewer employees than they did in 1937," reports Daniel P. Loomis, president, Association of American Railroads (AAR), Washington. "The job was done with 15,000 fewer locomotive units and nearly 100,000 fewer freight cars." While those statistics represent progress, the other side of the ledger tells a different story: Net operating income in 1960 ($584 million) was the lowest it had been since 1939.

Load per car and load per train hit new highs in 1960. Emphasis is trending toward special use cars that are light, have high capacity, and offer ease of maintenance and cargo versatility. The AAR estimates that the average freight car's capacity has moved steadily upward from 51.1 tons in 1945 to 55.6 tons now.

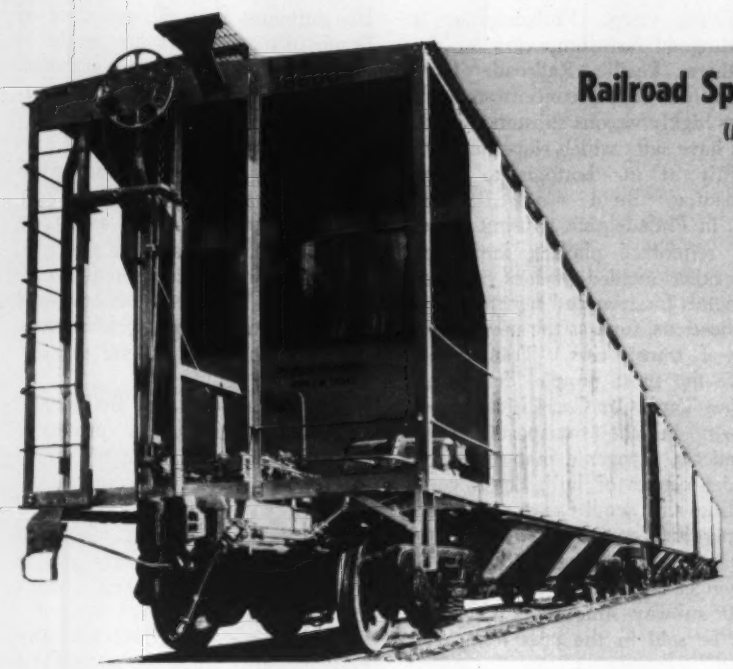
• **Aluminum Bids**—The aluminum industry is making a strong bid for railroad business, although the present 1.6 million fleet of Class I freight cars has only a minor number of aluminum types, perhaps 4000 tank cars, and around 2000 freight cars.

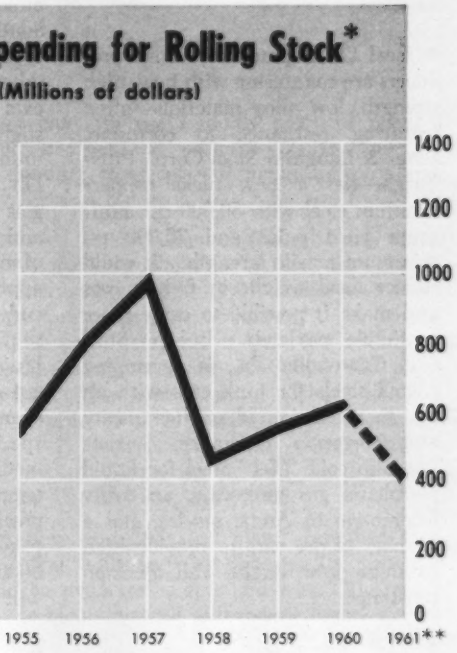
Aluminum producers have poured considerable sums into developing new alloys, such as the 5000 series with high magnesium content, to get high strength and greater corrosion resistance. Many of the alloys have high as-welded strength and can be cold formed on present equipment. The inert gas process offers fast welding and helps keep oxides out.

• **Competitive Points**—The industry's suppliers and the roads themselves are quick to point out: "We don't want to use materials where they aren't fully suitable." The chief mechanical officer of a Midwestern line comments: "We look for construction materials that have been proved. Among other factors, we determine initial car cost, maintenance estimates, lading uses, contamination problems, payload, and the degree of utilization."

This year, Kaiser Aluminum & Chemical Corp., Oakland, Calif., turned out a comprehensive report, "Compatibility of Aluminum in Railroad Service," which has a twofold purpose: ". . . to guide the railroads in making sound applications of aluminum to freight cars, and, equally important, to help to avoid unsound applications." It rates compatibility of various ladings with aluminum.

"The time is right," says James A.





Source: Yearbook of Railroad Information.
*Includes new equipment, rebuilding costs, and capital improvements.
**STEEL estimate.

Shape of Rail Equipment Market

Burt, manager of railroad sales, Aluminum Co. of America, Pittsburgh. "Alcoa spent 35 years in development and engineering work, trying new applications. The aluminum industry has excess capacity and can go after larger markets and offer fast delivery. Carbuilders are becoming better acquainted with fabricating aluminum. The railroads are interested in premium equipment that will speed material handling and transportation of goods. The stress placed on high capacity, lightweight rolling stock makes aluminum a natural."

• **Market Size**—"Presently, railroads are using about 20 million lb of aluminum annually," comments Neil W. Zundel, industrial market director, Reynolds Metals Co., Richmond, Va. "In the next 3½ years, demand will double to 40 million lb. Considering the future of containerization, we believe there is a potential 300 million lb annual market for aluminum in railroad uses."

The growth potential is strong in boxcar doors, roofs, linings, movable bulkheads, lading bars, and car ends. Alcoa revealed last week that Grand Trunk Western Railroad became the first U. S. line to standardize on aluminum boxcar roofs. Another important order from the Southern Railway System called for aluminum roll up doors that extend the length of the cars.

Covered hopper cars, bulk containers, open hoppers, and gondola cars are the big items for aluminum companies. Southern Railway System's order (in 1959) for 1205, high capacity aluminum gondolas and covered hopper cars was viewed as a breakthrough by the aluminum industry. Magor Car Corp., New York, is fabricating another 200 covered hopper cars for the Southern. Reynolds, the supplier of the aluminum used for the two large orders, says the new cars will have a capacity of 4800 cu ft and carry 100 tons.

• **Other Entries**—ACF Industries Inc., New York, has covered hopper design with an inverted, pear-shaped cross section for speedy unloading of dry bulk commodities. Louisville & Nashville Railroad has 40 covered hopper cars being built of aluminum. A 6 ton weight saving over steel cars is being claimed. Harvey Aluminum, Torrance, Calif., developed an 85 ft aluminum car in co-operation with Rock Island Lines and North American Car Corp., that's claimed to offer an 8 ton payload increase over steel equipment. Aluminium Ltd. and Canadian National Railways, both of Montreal, Que., formed a joint design committee in 1959 out of which evolved the Alcan Tank-Hopper car. It features elimination of a center sill, side posts, has curved sides, re-

duced welding footage, and fewer outlets.

• **Steel Developments** — Steel producers are countering with new, high strength, low alloy materials—often featuring resistance to corrosion. Jones & Laughlin Steel Corp., Pittsburgh, has a new nickel-copper-titanium steel with 50,000 psi minimum yield point and 70,000 psi minimum tensile strength. It could reduce dead weight in freight cars and make it possible to carry more profitable payloads. Lukens Steel Co., Coatesville, Pa., is developing coated steels for tank cars with an eye to protection of product purity and corrosion resistance. Lukens has also sold "T-1" steel for liquid petroleum gas tank cars, an Army locomotive in Arctic service, and a number of ore cars to provide high strength, low weight, and abrasion resistance.

• **Task Force**—U. S. Steel Corp. has adopted a task force approach to railroad market development. The group includes representatives from the railroad products section, the applied research laboratory, transportation industry market development unit, and product sections like stainless steel and high strength steel. The emphasis: Materials application.

The corporation's latest development is a Tenelon, stainless steel covered hopper car. Its corrosion resistant, easy to clean features are aimed at the bulk material shippers —from chemicals to food products. Tenelon is a manganese-chromium-nitrogen alloy.

Other U. S. Steel developments: Stainless steel linings on the floors of open hopper cars to facilitate unloading and reduce maintenance; vinyl coated steel for the interior of passenger coaches; and steels for cryogenic applications. A 9 per cent nickel entry, now used for storing and transporting liquefied gases, may one day obsolete mechanical refrigeration of freight cars.

Carbuilders are also exploring new designs and materials. Thrall Car Mfg. Co., Chicago, has introduced a 90 ton flatcar designed to handle coiled tin plate. General American Transportation Corp., Chicago, reports brisk business in tank cars for hauling propane, butane, and anhydrous ammonia. Baldwin-Lima-Hamilton Corp., Philadelphia, is building 40 fast-dump cars for the Southern Pacific Railroad. They will handle copper concentrates and other highly viscous substances. The cars have sides which slope outward slightly at the bottoms to speed unloading. Budd Co.'s Railway Div. in Philadelphia is using Fibreglas reinforced plastics, laminates, and other molded plastics in place of metals for trim and nonstructural applications, such as the upper front end of transit cars. Transit cars show the most promise for Budd. Union Tank Car Co., Chicago, sees growth in the transportation of chemicals, cryogenic materials, and special classes of bulk liquid commodities that require extreme purity, temperature control, and handling precautions. Pullman-Standard's passenger car division estimates that 9000 subway and commuter cars will be sold in the next ten years.

• **Piggybacking**—One of the brightest spots in the equipment market is the continuing growth of piggyback service and shipping in containers. In 1960, piggybacking brought more than 1 million truck movements to the 55 roads that offered the service—up 33 per cent from the 1959 mark.

One major leasing firm says roads can minimize operating costs, lower equipment expenditures, and yet have modern cars when needed if they lease the units. Trailer Train Co., Philadelphia, says its member roads can recapture lost business and develop new business by combining the speed and dependability of rail service with the flexibility of terminal trucking operations. The company plans to increase its ownership of rolling stock about 15 per cent in each of the next two years.

Other reasons for the growth are cited by Richard D. Hill, vice president-finance, Fruehauf Trailer Co., Detroit. "A boxcar earns about $4000 in revenue annually," he says. "Though it costs about 50 per cent more initially, a piggyback flatcar can earn about six times more annually than can a boxcar." One authority says piggyback service will eventually account for 60 per cent of all rail freight traffic. Mr. Hill notes that containerization of freight eliminates 7 to 15 handlings of goods moved from a producer to consumer. He estimates that 60 per cent of Fruehauf's containers are made of aluminum, and 40 per cent are steel. One roadblock: Standards for containers are needed.

• **Flatcars** — The piggyback push has put the flatcar in the limelight. Major carbuilders are using U. S. Steel Corp.'s high strength, low alloy Tri-Ten in their 85 to 89 ft flatcars. They can be equipped to handle automobile rack carriers, two standard trucktrailers, or containers.

Bethlehem Steel Co., Bethlehem, Pa., has introduced a prototype piggyback flatcar in the 85 ft, 70 ton capacity class. It features universal hardware for the transport of various piggyback ladings. The car also has hydraulic, long travel cushioning devices and truck mounted air brakes.

Southern Pacific Railroad, San Francisco, has unveiled an 87½ ft flatcar that holds promise for shippers of fragile goods and automobiles. It can be equipped with a removable, low weight, auto rack, carry containers, and it offers reduced shock transport through its special Hydra-Cushion underframe.

• **Spending Outlook**—In 1960, Class I railroads laid out $633 million for equipment. The latest authoritative estimates set the 1961 outlay at $401 million, the lowest since 1946. Reliable trade sources say spending will have to be substantially greater in 1962—at least $600 million, to merely keep up with obsolescence.

The spending picture is reflected in the condition of the rolling stock of the country's railroads—said to be in the poorest shape since the 1930s. Walter A. Renz, executive vice president, American Railway Car Institute, points out that more freight cars are being scrapped than are being replaced. He comments that about 10 per cent of the cars retained in the Class I fleet of 1.6 million cars are unfit for use. Some roads have as many as 32 per cent unfit cars. The backlogs of freight car builders are hovering near 10,000 units. In January of 1960, 48,170 cars were on order—the October, 1961, figure reads 10,133 cars.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

1961 Exports Show Gains

THE DOLLAR VALUE of U. S. metalworking exports was 7 per cent higher in 1961's first half than it was in the first half of 1960, the Commerce Department indicates. Makers of metalworking machinery led the brigade. Here are comparative figures:

(Millions of dollars)	1st Half 1961	1st Half 1960
Metals & Manufactures	977	973
Iron & Steel Scrap	190	107
Iron & Steel Mill Products	201	308
Aluminum	65	96
Copper & Copper-Base Alloys	205	157
Machinery & Vehicles	3,153	3,055
Electrical Apparatus	439	391
Industrial Machinery	1,356	1,231
Metalworking Machines & Machine Tools	231	170
Office Machines	155	94
Farm Equipment	283	293
Autos & Parts	568	668
Instruments	72	63

Five More Trade Missions

Five trade missions this fall bring to 100 the number of U. S. teams sent around the world in the last five years to promote our foreign trade. The five missions are visiting Nigeria, Peru, Ecuador, Indonesia, and Pakistan.

Nippon Kokan Expands

Nippon Kokan K.K. (Japan Steel & Tube Corp.) is planning a major expansion of production facilities. To be completed by the end of 1964 are a blast furnace with a daily capacity of 3000 tons, two L-D converters capable of turning out 150 to 200 tons daily, a slabbing mill, a continuous hot strip mill (80 in.), and a cold tandem mill (80 in.). At this point, the new steelworks will have an annual capacity of 1.2 million tons. A second expansion stage, to be completed by 1970, will boost capacity to 3.5 million tons annually. Included in the second stage will be four large blast furnaces, six L-D converters, a slabbing mill, blooming mill, hot strip mill, cold tandem mill, and a large plate mill. This facility will be the fourth steel plant for Nippon Kokan and will bring the firm's 1970 capacity to nearly 7.5 million ingot tons.

Around the World

SWEDEN—Sweden's crude steel output during the first half rose 12.6 per cent above the figure for the like 1960 period—to 1,835,000 tons . . . Sweden's new export slogan is "Sweden—Where Quality Is Tradition."

NEW ZEALAND—The New Zealand government is sending a top engineer on a world search for new industries that can use the nation's plentiful mineral deposits and hydroelectric resources. It is especially hopeful of landing chemical and metallurgical plants financed by firms in Norway, the U. S., and the U. K.

AUSTRALIA—U. S. investment in Australia may reach the $1 billion mark by the end of next year. U. S. investment there now totals $856 million—or one-third of total foreign private investment . . . Broken Hill South Ltd. plans to spend at least $13 million to reopen abandoned copper mines at Cobar, 450 miles west of Sydney. The population of Cobar, 2500, is expected to double as a $14 million-a-year industry is created . . . Political insiders believe Great Britain may move its giant Singapore air and naval base to West Australia. The base employs 40,000.

RUSSIA—A new iron and steel plant, described as a "giant," is being built in West Siberia. Its principal products will be structural shapes and wire. One report has it that the blooming mill will reduce ingots weighing up to 15 tons.

ITALY—Economic activity during the first half exceeded expectations. Industrial production rose 7 per cent above that of the like 1960 period; unemployment dropped 18 per cent; foreign trade rose 9 per cent; home construction climbed sharply; prices remained stable; and the government deficit held within forecast limits . . . Terminos Acciai Inossidabili S.p.A. is the name of a new Italian company to make rolled stainless steel products at Terni. Jointly owned by U. S. Steel Corp. and the Terni steelworks of the Finsider Group, it will begin operating by the end of 1963.

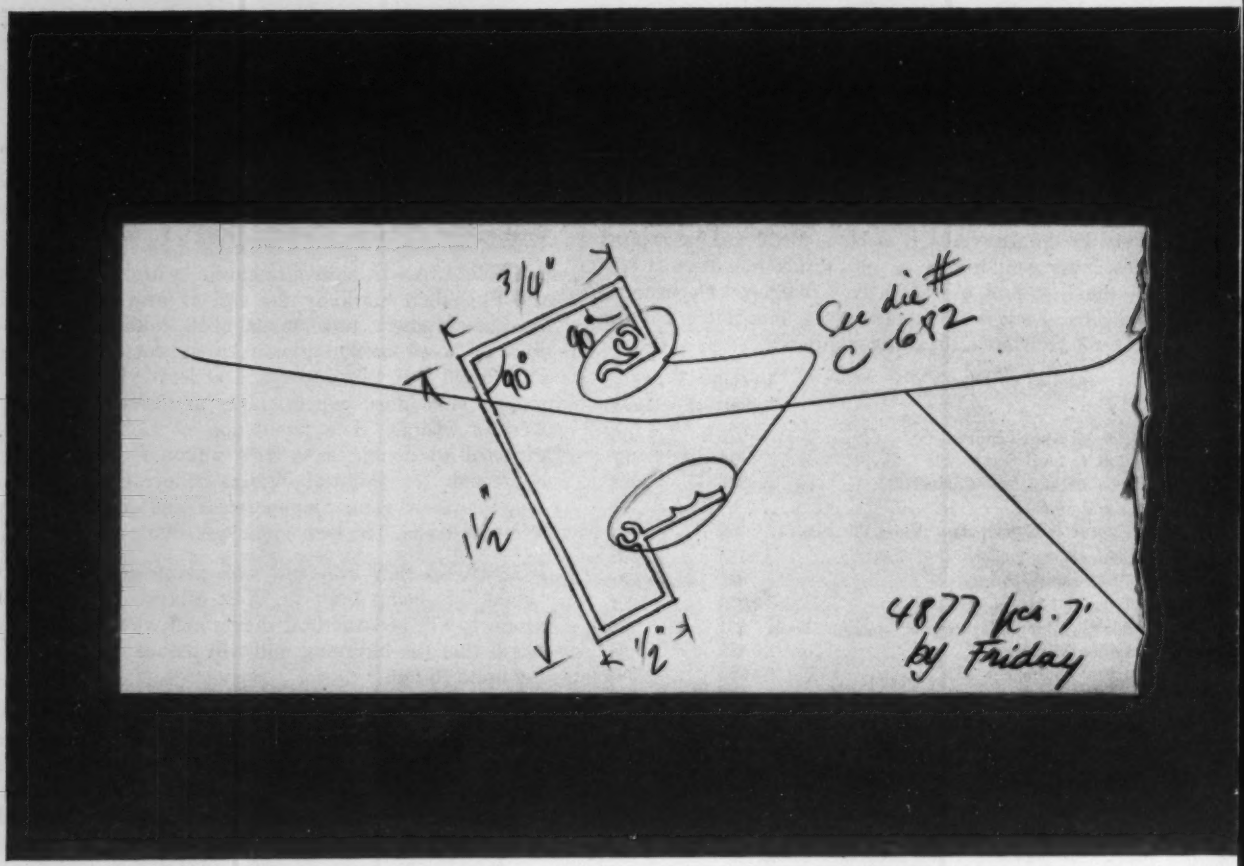
UNITED KINGDOM—British steel production is running at about 78 per cent of capacity, and the "buying lull" in Britain seems likely to last a few more months. Inventories are still high, and it's possible to get rapid delivery on most products, so buyers aren't likely to rebuild stocks to previous levels.

GERMANY—Disposable income in West Germany rose 11 per cent in the first half, largely due to higher wages . . . In the last ten years, the volume of German installment buying has expanded from $90 million to $850 million.

Sloppy Labels Create Delay

Sloppy labels on U. S. cargo cause 40 per cent of the delays, says International Cargo Handling Coordination Association. U. S. exporters are blamed for delaying their own shipments because of "sloppy labels and illegible markings." It is even said that U. S. shippers are "among the worst in the world" with their "hieroglyphic-like" inscriptions on outbound goods. Executives might well look into this matter.

Also, one wonders why telephone numbers are omitted on the stationery of so many U. S. companies. To call such firms, in response to an inquiry for example, can become a bit of a chore.



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1 Seal rings of Kennametal successfully control liquid oxygen and red fuming nitric acid used in rockets. Exposed to temperatures of 300°F, under pressures up to 80 psi, and rotating speeds of 17,500 rpm, the material previously used lasted only 120 minutes. Kennametal rings function over much longer periods without measurable seal face wear or leakage.

2 Needle valve, having solid Kennametal cone and ring, is used as pressure regulator in recovery of catalyst chemicals from exhaust gases—with temperatures reaching 1100°F and pressure differential of 215 psi. Kennametal cone weighs 57 pounds and ring weighs 28 pounds.

3 Kennametal unloader knives or scrapers, on a crystal dehydrator, increased service life to 12 months in processing highly corrosive ammonium sulfate, and to 4 months processing synthetic sulfate—a service ratio of 4 to 1, in each process, compared with knives previously used.

4 Ball and seat valves, made of both Kennametal and Kentanium, have operated successfully for years under severe conditions in oil well pumps, hydraulic systems and chemical processing equipment. They withstand abrasion, deformation, cavitation, high temperature and attack by corrosive agents up to 100 times longer than the hardest ferrous alloys.

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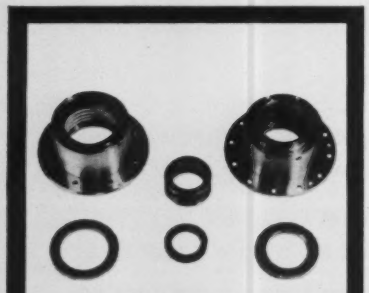
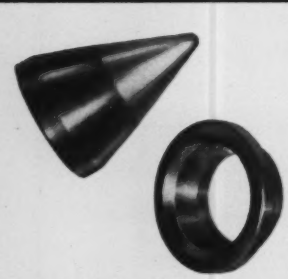


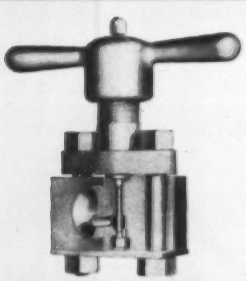
1. SEAL RINGS

4. BALL AND SEAT VALVES



2. VALVE CONE AND RING

3. DEHYDRATOR SCRAPERS



5. VALVE COMPONENTS

GM's Hafstad Looks at Future Powerplants

How Engine Performance Compares

Engine Type	Specific Weight Lb/hp	Fuel Consumption Lb/hp/hr
Nonregenerative Gas Turbine	1	1.00
Gasoline Engine	2	0.45
Regenerative Gas Turbine	2	0.55
Diesel	6	0.40
Free Piston	7	0.60
Steam Turbine	8	1.00
Stirling Engine	8	0.45
Diesel-Electric	18	0.45
Fuel Cell plus Electric Motors	60	0.10

Source: GM Research Laboratory.

THE POSSIBILITY of the gas turbine replacing the piston engine in automobiles is remote, asserts Dr. Lawrence R. Hafstad, vice president in charge of General Motors Corp.'s research laboratories.

Says Dr. Hafstad: "We think the first practical use of gas turbines lies in the field of military vehicles where effectiveness rather than cost is the controlling factor." He feels a special niche may be found for them in the trucking industry.

As for the outlook for other powerplants, the research chief says: Free piston engines look best for marine use. Power sources and conversion units like nuclear and thermionic energy plants eventually will supplement some present prime movers, probably in the missile and space field. "Power costs in that field of $50 to $100 per pound are tolerable, whereas to be competitive in the auto industry, cost for powerplants must be held around $1 a pound," Dr. Hafstad points out.

• **Big Potential**—GM is keenly interested, however, in the Stirling cycle engine. It's too costly for autos, but it looks good for space. GM's Allison Div. is developing a small solar powered unit for an Air Force space project. Dr. Hafstad's group has built a 10 hp portable unit for the Army.

The Stirling cycle engine (it rates only a third of a chapter in most textbooks today) was first patented in Scotland in 1817. When the gasoline powerplants came along at the turn of the century, the Stirling engines were forgotten for several years. In the mid-1930s, Philips Electrical

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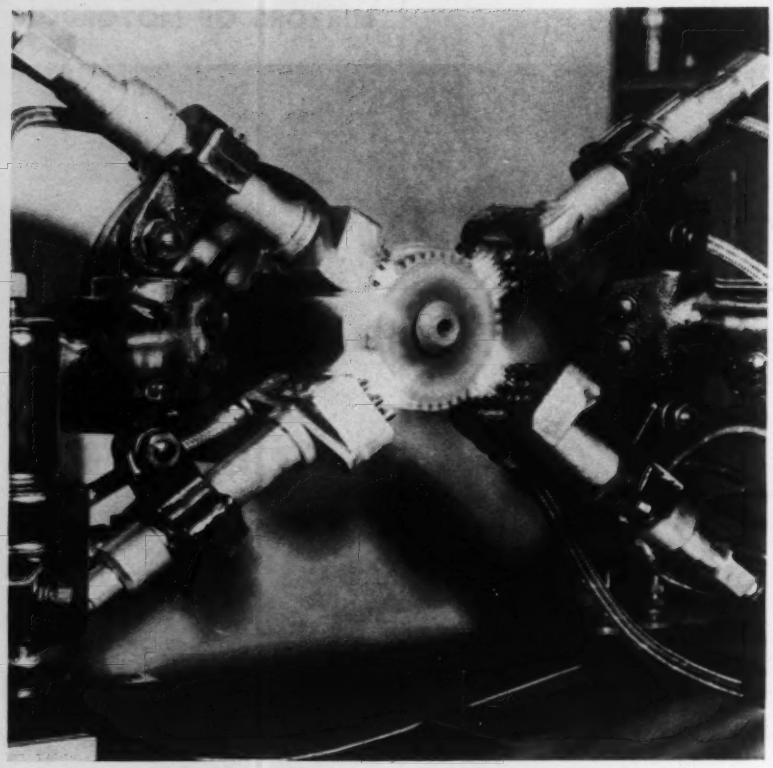

Time Saver in Heat Treating

AN AUTOMATIC gear hardener is used by Oldsmobile Div., General Motors Corp., to heat treat replacement gears for production equipment. The cycle takes 40 seconds, compared with a conventional manual method that took 4 hours. The gear automatically revolves on the mounting spindle as it's exposed to high temperature oxygen-gas jets that harden it to a depth of 1/16 in. An electric eye measures temperature. When it reaches 1550 to 1600° F, the flame shuts off and the gear automatically is ejected into quenching oil. The device handles gears up to 16 in. outside diameter.

Co., Eindhoven, Holland, revived the concept to provide power for portable radios. Because the engine has a reversible heat cycle, Philips also used it for cryostats for low temperature refrigeration. GM is working under a Philips license to see what the Stirling cycle will do for Space Age powerplants.

• **How It Works**—In simplest terms, the Stirling cycle depends on the expansion and contraction of a working gas (usually nitrogen) which drives a two piece power piston. The gas and piston are contained in an enclosed circuit. The piston also helps move the gas through the system. The gas passes through a cooler which contracts it, then goes through a regenerator which saves heat. The gas is preheated to working temperature from an outside energy source (electricity, burning fuel, solar, or nuclear energy). Typical operation provides 3 to 5 hp at 3000 cpm.

The reason GM thinks the Stirling cycle has real promise is that it can obtain heating and refrigeration effects from the same engine as well as mechanical power. There's no expansion within a cylinder so there are no combustion products to remove. That also makes for quiet operation. The engine has high efficiency and little fuel is needed to preheat the working gas.

New Ride Stabilizer

A RIDE stabilization system that operates from hydraulic pressure has been developed by Westinghouse Electric Corp., Pittsburgh. Company researchers call it an "active" system since it uses hydraulic power to force the body of a vehicle to stay put regardless of what the wheels are doing.

Westinghouse officials say they have talked with automakers about the stabilizer but admit that cost is a deterrent. The method is estimated to cost at least twice as much as present shock absorbers and springs. Its real future seems to lie in the field of military vehicles.

Heart of the stabilizer: Four mechanical controls mounted at each corner of the chassis. They sense any change in position caused by road bumps, braking, or turning. The control units automatically start correction by operating a set of valves that vary oil pressure in four hydraulic actuators that replace the usual shock absorbers. If a wheel drops into a chuck hole, for example, oil pressure pushes down a piston inside the actuator cylinder. That tends to hold the body level and helps the wheel to reposition itself. The important point is that the pistons are forced under power. They just don't react to the drop as a shock absorber would.

U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,241
April	446,739	582,869
May	542,303	611,260
June	599,474	613,136
July	399,191	434,377
August	195,266	305,514
September	354,491	407,691
9 Mo. Totals	3,725,665	4,957,076
October	.....	617,972
November	.....	597,638
December	.....	523,422
Total	.....	6,696,108

Week Ended	1961	1960
Sept. 23	73,034	120,722
Sept. 30	114,551	134,118
Oct. 7	102,098	140,832
Oct. 14	96,207	144,056
Oct. 21	142,910†	146,339
Oct. 28	170,000*	150,019

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

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For application ideas, design recommendations and full method information, send for the Nelson "Design Manual". **NELSON STUD WELDING,** Division of Gregory Industries, Inc., Department S, Lorain, Ohio.

GREGORY INDUSTRIES

Economists Bank on Consumer

NEXT YEAR could be the best business year in history.

Most economists attending the annual meeting of the National Association of Business Economists (NABE) in Chicago last week tended to echo that observation of A. J. Ashe, director of business research for B. F. Goodrich Co. But agreement on another point added a note of caution: The prediction won't come to pass unless consumer purchases begin to pick up within the next few weeks. The economists (about 200 of them) were hopeful, but the gain in consumer buying still isn't an accomplished fact.

Three Key Factors

Dr. George Cline Smith, NABE president and senior partner of MacKay-Shields Associates, added two key qualifications to the prediction for 1962 business.

"The forecasts of boom in 1962 are predicated on increases in business spending for new plant and equipment. But through September, there was precious little evidence that such an increase was actually getting underway. This is a little strange in view of the unanimity of forecasts of prosperity. An increase in consumer spending, with the corresponding improvement in earnings, would go a long way toward improving the business capital investment picture. And I honestly think this will occur, despite all the question marks."

Dr. Smith stated that a number of unfortunate incidents and statements have given some businessmen cause to feel that the government is antibusiness. "In fairness, I do not believe that the administration is consciously antibusiness," he declared. But, he added, "government is going to have to act as though it thought business were more of an ally than an enemy," if the economy is to reach the goals forecast for it.

Spotlight on Consumer

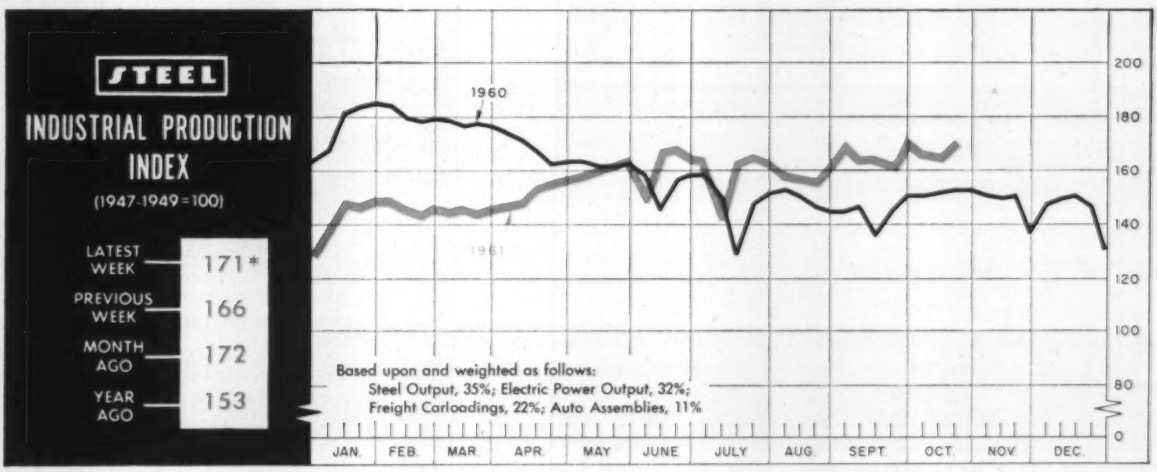
The burden on the consumer is growing steadily, and many observers at the meeting feel that time is running out. Typical of the corridor talk: "If we don't have definite signs of greater personal consumption spending by November, we have had it."

But one expert, Arthur Rosenbaum, director of business research for Sears, Roebuck & Co., says that spending will rise, and durable goods will show the biggest sales gains. He said total personal consumption expenditures in 1962 will top 1961's by 6 per cent. Durable goods will be up 9 per cent, nondurable up 5 per cent, and services up 6.5 per cent.

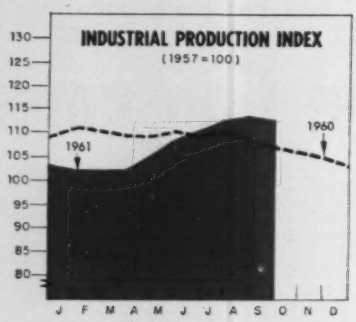
"The more or less static trend in consumer spending for durable goods in recent years," he stated, "has at least three important rationalizations: 1. Consumers have already amassed record inventories of durables and have piled up a record amount of installment debt. 2. There has been a slackening in the rate of family formations. 3. Chronic, large scale unemployment has affected the purchasing power of a large segment of the population."

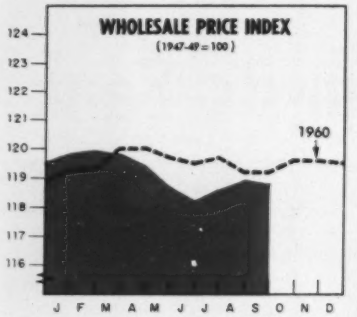
Despite Dr. Smith's warning that "all is not right with our economy," most of the economists presenting forecasts for segments of the economy were on the optimistic side. Some admitted that their optimism was based on future events, but they were pretty well convinced that they would materialize.

● **Electrical Equipment** — Depending on how substantial the rise is



*Week ended Oct. 21.





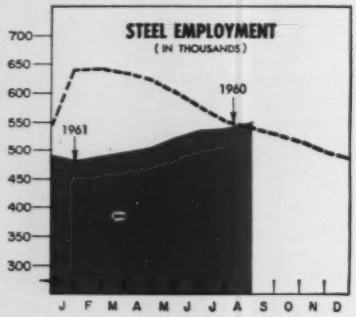
(Seasonally adjusted)

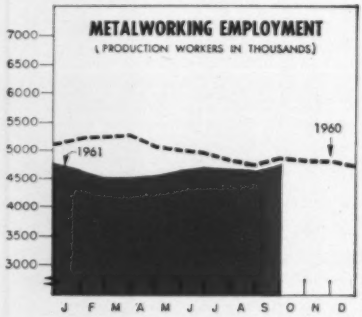
	Total Production 1961	Total Production 1960	Total Mfg. 1961	Total Mfg. 1960	Durables Mfg. 1961	Durables Mfg. 1960
Jan.	102	111	101	112	95	111
Feb.	102	110	101	110	94	109
Mar.	102	109	102	110	95	108
Apr.	105	109	105	109	99	106
May	108	110	108	110	103	107
June	110	109	111	110	105	105
July	112	110	112	110	107	106
Aug.	113	108	113	108	108	104
Sept.	112*	107	112*	107	105*	102
Oct.	...	106	...	106	...	101
Nov.	...	105	...	104	...	98
Dec.	...	103	...	103	...	96
Avg	...	108	...	108	...	104

Federal Reserve Board. *Preliminary.

	All Commodities 1961	All Commodities 1960	Other Than Farm & Foods 1961	Other Than Farm & Foods 1960
Jan.	119.8	119.3	128.0	128.8
Feb.	119.9	119.3	128.0	128.7
Mar.	119.8	120.0	128.1	128.6
Apr.	119.4	120.0	128.0	128.7
May	118.7	119.7	127.6	128.2
June	118.2	119.5	127.4	128.2
July	118.6	119.7	127.4	128.2
Aug.	118.9	119.2	127.4	128.2
Sept.	118.8	119.2	127.5	127.9
Oct.	....	119.6	....	128.0
Nov.	....	119.6	....	127.9
Dec.	....	119.5	....	127.9

U. S. Bureau of Labor Statistics.





	Employment In Thousands 1961	Employment In Thousands 1960	Payroll In Millions 1961	Payroll In Millions 1960
Jan.	478	641	$274.9	$398.8
Feb.	484	643	267.1	381.4
Mar.	492	637	298.1	398.8
Apr.	501	626	292.0	357.2
May	519	604	326.2	339.8
June	532	580	321.1	316.0
July	538	554	307.0	287.0
Aug.	545	543	336.8	300.3
Sept.	...	531	....	287.2
Oct.	...	516	....	284.8
Nov.	...	499	....	270.4
Dec.	...	486	....	267.9

American Iron & Steel Institute.

Charts copyright, 1961, STEEL.

1960	Prim. Mtls.	Fab. Prod.	Machinery	Elec. Mchy.	Trans. Equip.
Sept.	905	835	1,104	877	1,135
Oct.	891	834	1,087	839	1,149
Nov.	871	816	1,087	867	1,153
Dec.	851	794	1,081	844	1,125
1961					
Jan.	838	771	1,075	842	1,068
Feb.	829	755	1,077	835	1,012
Mar.	833	750	1,076	830	1,013
Apr.	845	762	1,081	827	1,018
May	877	788	1,082	837	1,059
June	898	801	1,079	844	1,064
July	899	783	1,068	837	1,048
Aug.	911	808	1,061	859	973
Sept.	925	816	1,070	881	1,029

U. S. Bureau of Labor Statistics.

this quarter, sales of electrical equipment could be from 2.5 per cent below the 1960 total to 2.5 per cent above it. But A. J. Nesti, chief statistician of National Electrical Manufacturers Association, declared: "For the year 1962, there does not appear to be any qualification. An increase in volume of 5 to 10 per cent over 1961's is expected."

• **Rubber Goods**—Tire shipments next year will reach an all-time high of 132 million units, up 10 million from 1961's, said Goodrich's Mr. Ashe. The prediction is based on a record replacement market and anticipated output of 6.6 million passenger cars and 1.25 million trucks and buses. Industrial rubber product sales will also rise, with hose and belting up 13 per cent.

• **Housing**—There should be mild improvement in new housing starts next year, said David K. Gillogly, associate director of economics, National Association of Home Builders. Compared with the 1.3 million starts expected this year, the total should be 1,375,000, plus or minus 25,000 units, in 1962. However, with lower priced houses and increased emphasis on apartment units, dollar value probably will lag the unit count. Home improvement spending will rise, he said.

• **Inventories**—Retailers have been working on tighter control of stocks since 1951, stated J. Roger Wallace, economist for the *Journal of Commerce*. Each peak of accumulation has been a bit lower than the preceding one, and each trough has been deeper. "Now, the contraction in retailer inventories relative to sales seems to have gone as far as it is likely to go." This improves the inventory outlook, he claimed. Inventories at the end of 1961 are expected to total $95 billion. One year later, they should be in the $100 billion to $103 billion range, which would not be excessive.

• **Steel**—Look for ingot production of steel to be between 110 million and 115 million ingot tons in 1962 compared with about 100 million tons this year, predicted William P. Carlin, director of economics, Republic Steel Corp. Mr. Carlin first made such a prediction about a month ago, but he told STEEL that nothing that has happened in the meantime has changed his outlook.

• **Chemicals**—While the chemical industry will be bothered by diverse trends among its components, total production will show a 10 per cent gain next year, following a 5 per cent gain in 1961, opined Ira T. Ellis, economist, E. I. du Pont de Nemours & Co. Inc. However, the average production level next year will be only about 5 per cent higher than it was in the third quarter of this year, which was up con-

siderably from the recession level of the first half.

• **Government Spending** — Federal, state, and local government spending in 1961 will rise to $108 billion, $8 billion over last year's. A further rise of $11 billion is expected in 1962, predicted Morris Cohen, associate editor of *Fortune*.

• **Farm Equipment** — A current change for the better in the attitudes of farmers could bring as much as a 10 per cent gain in shipments of farm machinery and wheel tractors next year, declared Lester C. Sartorius, staff economist, Deere & Co. Uncertainty over the government's farm program and reductions in acreages this year dampened sales. But farmers should have more definite information about the scope and long range effects of the acreage program and new price supports in 1962, plus higher income.

• **P&E Spending**—Business spending for plant and equipment will run well over $40 billion in 1962 compared with $35 billion this year, forecast Douglas Greenwald, manager, economic services, McGraw-Hill Publishing Co. Inc. This is not based on the preliminary result of his company's fall survey of spending plans, but on the fact that:

1. Historically, capital expenditures rise for six consecutive quarters following the trough.

2. New orders for capital goods are rising, especially for machinery.

3. The rise in industrial production is narrowing the production-capacity gap. Cash flow and corporate profits are moving up to all-time highs. Profit margins also are improving, making more internal funds available for capital spending in 1962 than in 1961.

• **Back to Earth**—Despite the numerous predictions of increased business there is a possibility that the recovery may be running out of steam, cautioned Irwin M. Stelzer, president, National Economic Research Association Inc. He noted that for the past five months: "The economy has been undergoing a progressive deceleration which is not characteristic of past recoveries. Should present trends continue, it is unlikely that the Federal Reserve Board's Industrial Production index, now at 112 (1957=100), will exceed 120 by mid-1962, or reach 125 by yearend 1962."

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	2,035[1]	2,042	1,545
Electric Power Distributed (million kw-hr)	15,150[1]	15,125	14,191
Bituminous Coal Output (1000 tons)	8,840[1]	8,770	8,692
Crude Oil Production (daily avg—1000 bbl)	7,153[1]	7,151	6,771
Construction Volume (*ENR*—millions)	$612.5	$388.9	$400.2
Auto, Truck Output—U. S., Canada (*Ward's*)	176,433[1]	119,219	169,703
TRADE			
Freight Carloadings (1000 cars)	645[1]	642	637
Intercity Truck Tonnage (changes from year ago)	+4.7%	+4.2%	−1.4%
Business Failures (Dun & Bradstreet)	341	330	326
Currency in Circulation (millions)[2]	$33,010	$32,886	$32,304
Dept. Store Sales (changes from year ago)[2]	0%	+6%	−4%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$27,818	$26,655	$29,772
Federal Gross Debt (billions)	$296.2	$293.6	$287.5
Bond Volume, NYSE (millions)	$28.6	$29.8	$21.6
Stocks Sales, NYSE (thousands of shares)	16,802	16,173	12,932
Loans & Investments (billions, adjusted)[3]	$117.0	$116.2	$105.6
U. S. Govt. Obligations Held (billions)[3]	$342	$336	$275
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	225.0	225.2	222.2
All Commodities[6]	118.5[1]	118.5	119.0
Commodities Other than Farm & Foods[6]	127.2[1]	127.1	127.6

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

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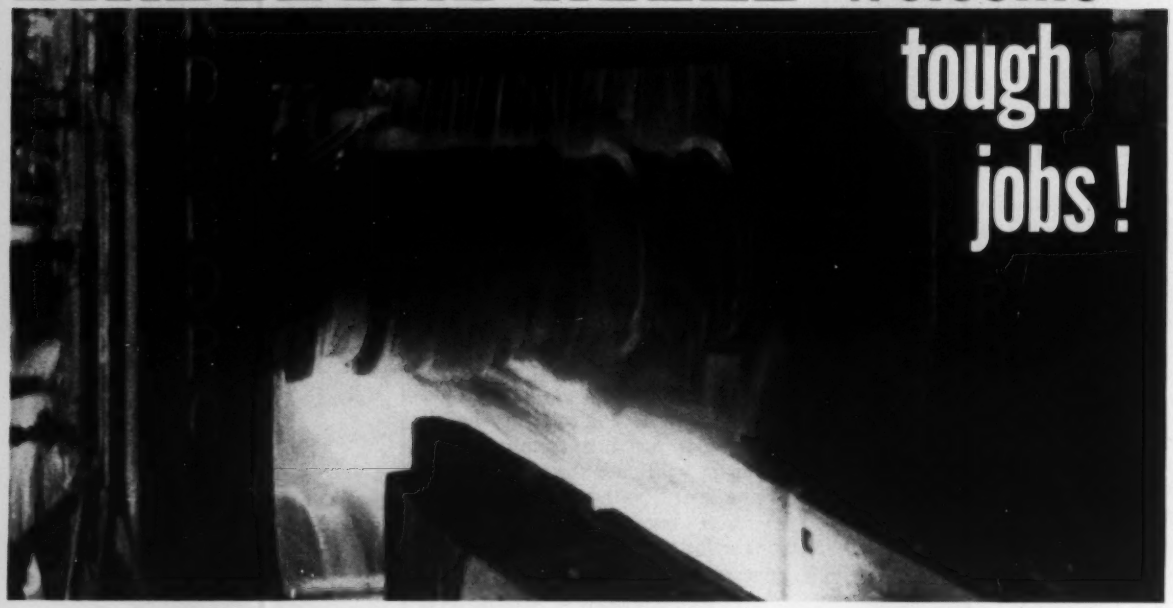

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Keystone Steel president

A. B. FISHER JR.
Koppers div. chief eng.

NORMAN F. KELLEY
Revere Copper div. sales

IRWIN J. LUBALIN
Shaw Process exec. v. p.

Daniel P. Sommer, executive vice president, was elected president of **Keystone Steel & Wire Co.,** Peoria, Ill. He replaces the late **Reuben E. Sommer.**

A. B. Fisher Jr. was made chief engineer, Engineering & Construction Div., **Koppers Co. Inc.,** Pittsburgh.

Richard T. Baseler was named assistant engineering manager, **Pratt & Whitney Aircraft Div.,** East Hartford, Conn., United Aircraft Corp. **Walter Doll** was named chief engineer-advanced power systems; **Donald J. Jordan** chief engineer-advanced jet powerplants.

Willard H. Brown, former plant manager-Milwaukee factory, was made manager of manufacturing, supervising **Durant Mfg. Co.'s** entire manufacturing operation now located in Watertown, Wis. **Harold F. Bemm,** former production manager-Milwaukee plant, was made manager of the Customer Service Dept. at the Milwaukee sales offices.

Norman F. Kelley was made sales manager of the New Bedford, Mass., Div. of **Revere Copper & Brass Inc.** Former assistant sales manager, he succeeds **Charles G. Miller,** retired. **Phillips L. Waterman** was appointed a special executive representative at Revere's Detroit headquarters.

William H. Doolan was appointed sales manager, **P. F. McDonald & Co. Inc.,** Boston.

Harold A. Zell was made general manager, **Firth Sterling (Canada) Ltd.,** Brantford, Ont.

Ralph H. Hoefs was made chief metallurgist of **Chain Belt Co.'s** research center, Milwaukee. He was assistant chief metallurgist.

Donald A. Fitch was made manager of sales, pipelines for **National Tube Div.,** Pittsburgh, U. S. Steel Corp. He succeeds **Arthur J. Elbert Jr.,** recently named general sales manager.

Irwin J. Lubalin was appointed executive vice president, **Shaw Process Development Corp.,** division of Avnet Electronics Corp., Port Washington, N. Y. He was general manager. He was also appointed a vice president of British Industries Corp., an Avnet division.

Jack L. Pettit joined **Circo Corp.,** Clark, N. J., as director of manufacturing. He was with Carr Fastener Corp., serving as chief manufacturing engineer.

Charles W. Diven Jr., assistant vice president-sales, **Sharon Steel Corp.,** moves his office from headquarters in Sharon, Pa., to New York, effective Nov. 1. **Robert W. Keenan** was made assistant to the vice president-sales, and is succeeded as manager of production planning by **Patrick L. Henry.**

Albert S. Rairden was made general manager, **Newton Hydraulic Tooling Co. Inc.,** Auburn, Mass. He was plant manager of the Palmer,

WILLARD H. BROWN
Durant mfg. manager

RALPH H. HOEFS
Chain Belt metallurgist

DONALD A. FITCH
National Tube sales post

ALBERT S. RAIRDEN
Newton Hydraulic gen. mgr.

GEORGE PERRAULT JR.

N. LAURENCE DESMOND

E. W. Bliss division appointments

H. E. HIRSCHLAND

B. W. WEBER

Metal & Thermit group vice presidents

Mass., mill, Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp.

E. W. Bliss Co. consolidated its Salem and Canton, Ohio, operations into a Heavy Equipment Div. **George Perrault Jr.**, former vice president and manager of the Salem Div., was named manager of the new division with headquarters in Salem. Corporate headquarters remain in Canton. **N. Laurence Desmond** was named factory manager of the Hastings, Mich., Div. **James L. Chase** was named sales manager, container machinery at Hastings.

William L. Hoffman was made director of administration and materiel for **Hughes Aircraft Co.**, Culver City, Calif.

Speakman Co., Wilmington, Del., named **Willard A. S. Denham** general manager of its new Safety Equipment Div., responsible for all phases of the division including sales, marketing, production, and new product research and development.

Metal & Thermit Corp., New York, appointed four group vice presidents: **H. E. Hirschland** for the Commercial Development and Research Divisions; **B. W. Weber**, Manufacturing, Employee Relations, and Administration Divisions; **J. L. Oberg**, Minerals, Ceramics & Welding Divisions; and **D. W. Oakley**, Chemicals, Coatings & Plating Divisions.

Nelson C. Corcoran Jr. was made general sales manager, **Waterbury Rolling Mills Inc.**, Waterbury, Conn.

Frank C. Querry Jr. was made product engineer, Clark-Cooper Div., **Frederic B. Stevens Inc.**, Detroit.

Robert G. Hill was named vice president-sales, **Leece - Neville Co.**, Cleveland. He was general sales manager.

David C. Cannon fills the new post of director of marketing, **Blaw-Knox Equipment Div.**, Pittsburgh, Blaw-Knox Co. He was assistant general manager, Disston Div., H. K. Porter Company Inc.

William M. James, general manager, was promoted to vice president-sales, **Scherr-Tumico Inc.** He moves from New York to company headquarters at St. James, Minn. He succeeds **Robert V. Anderson**, recently made managing director of Scherr - Tumico Israel. Scherr-Tumico Inc. was formed last year with corporate integration of George Scherr Co., New York, and Tubular Micrometer Co.

Albert J. Furman was made manager of manufacturing, **Wilton Tool Mfg. Co. Inc.**, Schiller Park, Ill.

Joseph N. Noll was named to the new post of director of purchasing, **Wigton-Abbott Corp.**, Plainfield, N. J. **Louis C. Denis** succeeds Mr. Noll as purchasing agent.

B. W. Crenshaw was appointed executive vice president and general manager, **Scullin Steel Div.**, St. Louis, Universal Marion Corp. He was vice president-sales.

WILLARD A. S. DENHAM

heads Speakman Co. div.

ROBERT G. HILL

Leece-Neville v. p.

DAVID C. CANNON

Blaw-Knox Equipment post

B. W. CRENSHAW

Scullin Steel executive

Charles D. Manhart was appointed vice president of **Martin Co.**, Baltimore, to head its new Martin Electronic Systems & Products Div., which is responsible for development, design, manufacture, and sales of electronic systems and products for missile, space, and undersea applications.

Kenneth M. Spurgeon was made general sales manager, **Hupp Aviation Div.**, Chicago, Hupp Corp. He was sales manager-defense products group.

William E. Horenburger was made national sales manager for **General Bearing Co. Inc.**, West Nyack, N. Y., and its subsidiary, BMB Corp.

A. W. Knutson was appointed vice president - sales, **American Steel Warehouse Co.**, Portland, Oreg., and subsidiaries. He was general manager-Portland branch.

Paul E. Smith was named to the new post of vice president-sales, **Chase Foundry & Mfg. Co.**, Columbus, Ohio. He was formerly chief engineer and purchasing agent.

Jack H. Bernstein was made general manager of **CompuDyne Electronics Inc.**, subsidiary of CompuDyne Corp., Hatboro, Pa. He was with General Dynamics Corp.

A. L. Allen, former general superintendent, Mansfield, Ohio, plant, **Empire-Reeves Steel Corp.**, was made assistant works manager, Mansfield plant. **L. F. McCaffrey** was made general superintendent; **Andrew Patton** assistant general superintendent.

Donald V. Brondyke was named president of Roberts Tube Div. and vice president of the parent company, **Prestyle Mfg. Co.**, Detroit. **Paul Stocky** was named president, Stamping Div., in addition to his present duties as executive vice president of Prestyle.

Richard A. Hagberg was made vice president-general manager, **Triad Transformer Corp.**, division of Litton Industries, Beverly Hills, Calif.

Robert H. Davies, president of **Electric Autolite Co.**, Toledo, Ohio, announces that the Electrical Products Div. is now under his direct control following resignation of **S. A. Keller**, vice president and group executive of the division.

CHARLES D. MANHART
heads Martin Electronic

KENNETH M. SPURGEON
Hupp Aviation gen. sales mgr.

WILLIAM E. HORENBURGER
General Bearings sales mgr.

A. W. KNUTSON
Amer. Steel Warehouse v. p.

WILLIAM K. LANCET
Eng. Metal Products v. p.

WILLIAM H. GOLDBACH
heads TRW Ordnance Wks.

William K. Lancet was appointed vice president-sales, **Engineering Metal Products Corp.**, Indianapolis. **Chester T. Reynolds** was appointed vice president-operations; **Richard A. Lancet** vice president-administration.

Harold K. Brooks was elected president and secretary, **Pittsburgh Tube Co.**, Pittsburgh. **Harry M. Feely Jr.** was elected executive vice president.

Walter F. O'Connell was elected president and chairman of **United Nuclear Corp.**, New York. He succeeds **William C. Foster**, appointed director of the newly created United States Arms Control & Disarmament Agency.

E. J. Fithian Jr. was named manager-locomotive engines for **Cooper-Bessemer Corp.**, Mt. Vernon, Ohio.

Wesley R. Johnson, vice president, International Div., **Illinois Tool Works Inc.**, Chicago, returned to the Chicago executive offices after six years in England, directing company activities in the British Isles and on the European continent.

Thompson Ramo Wooldridge Inc., Cleveland, named **William H. Goldbach** manager of its new Ordnance Works at the Tapco plant, Euclid, Ohio. He was industrial engineering manager of the Jet Div.'s Cleveland Works.

Frank L. Bissonette was made purchasing agent for **Basco Inc.**, North Tonawanda, N. Y. He was with Tube Manifold Corp.

OBITUARIES...

Martin Fladoes, 65, chairman, **Sivyer Steel Casting Co.**, Milwaukee, died Oct. 16.

H. K. Wilson, 60, an assistant general manager, Lackawanna, N. Y., plant, **Bethlehem Steel Co.**, died Oct. 15.

J. W. Higgins, 87, chairman, **Worcester Pressed Steel Co.**, Worcester, Mass., died Oct. 13.

Walter M. Fairbairn, chairman, **Barnes Drill Co.**, Rockford, Ill., died Oct. 5.

Cosco Stools, Tables, Carts are . . .

"Made Like A Million" with Pittsburgh Steel Sheet

Make your products "like a million" and you'll sell them by the million.

That's the philosophy practiced at Hamilton Cosco, Inc. of Columbus, Indiana, manufacturer of nationally known Cosco brand tubular steel frame household and juvenile products and office chairs.

And the philosophy has paid off.

Introduced 16 years ago, Cosco household stools have averaged nearly a million units a year. Their success led to development of other popular Cosco products ranging from baby jumpers to executive office chairs.

Pittsburgh Steel Company plays an important part in Hamilton's success by supplying substantial quantities of cold rolled sheet that consistently meet Cosco's ultra-critical requirements.

For, at Hamilton there's no such thing as a "second" in a finished product, be it serving cart or stool, playpen or folding bridge chair. The slightest imperfection — in forming, bending, painting or plating — requires reprocessing or scrapping of the defective item.

Supplying cold rolled sheet that faithfully meets such air-tight quality control places unusual responsibility on the steel supplier.

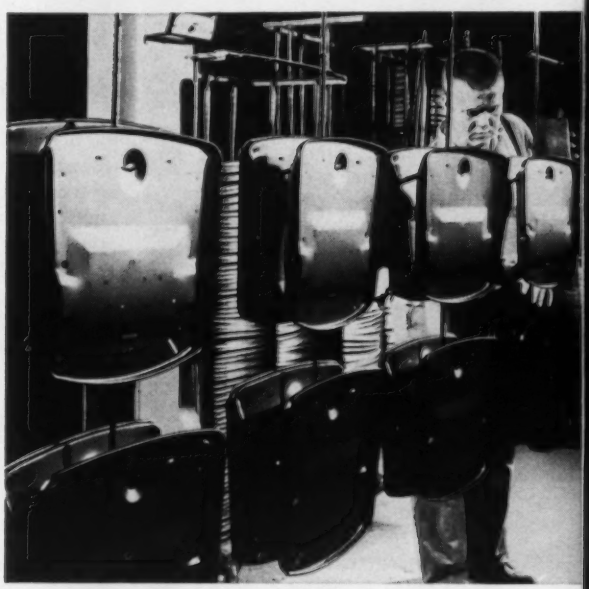
But, Pittsburgh Steel regularly meets this obligation with sheet known throughout the metalworking industry for its three "F" qualities:

- **Flatness** — for exposed surfaces where appearance is vital and for fast production on automatic and semi-automatic equipment.
- **Finish** — dense, exceptionally clean surface for critical finishing operations, particularly Hamilton's electrostatic painting process.
- **Formability** — for precise uniformity in stamped, drawn, rolled or bent shapes; and especially for non-fluting characteristics in difficult bends on electric-welded tubing rolled

The three "F" features of Pittsburgh Steel sheet—**flatness, finish, formability**—show up in assembly of the popular Cosco "Hour Glass" step stool. Gleaming backrests, gracefully curved tubular legs and brackets, seat pans and fold-away steps, all reflect quality of Pittsburgh cold finished sheet.

Flatness of Pittsburgh cold rolled sheet is critical for appearance, rigidity of stool seat and for trouble-free production in long runs. Here, after forming and piercing, raw edges are turned under.

Formability of Pittsburgh Steel sheet is demonstrated here as ¾ inch tubing, rolled from slit sheet, takes severe bends and deformation required for backrest brackets. Non-fluting quality of steel on radius of bends is vital on this and all other tubular parts produced by Hamilton Cosco, Inc.



Finish of Pittsburgh Steel sheet provides dense, exceptionally clean surface for tight, smooth paint adherence required by Hamilton's electrostatic painting process. Seat pans for Cosco's unique gatefold card table chairs show painting quality of steel.

from Pittsburgh Steel sheet.

H. E. Spurgeon, purchasing agent, said:

"The company's success is based on its insistence on absolute quality of its products—and that means quality starting with raw steel. We do many things merely because it's the best way.

"Performance of Pittsburgh sheet is very good, we've found. Over-all, I'd say Pittsburgh Steel is a very satisfactory supplier."

Pittsburgh Steel Company sheet—the steel with the three "F" qualities—can help step up your product quality, too, whether you're using hot rolled or cold rolled, sheet widths or strip widths. Contact one of the Pittsburgh Steel Company District Offices listed here. We'll match the steel to your product.

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

Atlanta	Cleveland	Dayton	Los Angeles	Pittsburgh
Chicago	Dallas	Detroit	New York	Tulsa
		Houston	Philadelphia	Warren, Ohio

Steel

Allvac Orders 10,000 lb Vacuum Melting Furnace

A 10,000 LB VACUUM induction melting furnace will be installed by early 1962 at Allvac Metals Co., Monroe, N. C., by F. J. Stokes Corp., Philadelphia, and Inductotherm Corp., Rancocas, N. J. The unit will produce the company's line of high temperature magnetic and nuclear alloys.

The furnace will have a vertical melting and casting chamber 20 ft in diameter by 40 ft high and will permit casting of ingots up to 20 ft long.

Stokes will design and supervise the fabrication of the vacuum chamber and will also supply the large capacity vacuum pumping system consisting of six, 16 in., oil vapor booster pumps and six mechanical booster pumps.

Inductotherm will design and make the induction furnace and the 1000 kw power source. Total cost of the installation, including melting process building and related gear, will be about $450,000, says Allvac.

Allvac was formed in the spring of 1957 by J. D. Nisbet, formerly of General Electric Co. and Universal-Cyclops Steel Corp. Up to now, it has been concentrating on production of fabricated products made of special metals. With the new furnace that can melt 10,000 lb of metal in about 3 hours, the company will also move into production of electrodes for consumable arc, remelting furnaces.

Allvac also does its own rolling. A five stand, three high rolling mill that will quadruple previous capacity has just been installed. The firm is utilizing new laboratory facilities for metallurgical and chemical analysis.

Forms Space Metals Div.

Seaway Nickel Corp., Buffalo, a subsidiary of Roblin-Seaway Industries Inc., has established a Space Metals Div. to develop and produce high temperature metal alloys for rocket and jet engines and other space industries.

Sandmeyer Buys Plant

Sandmeyer Steel Co., Philadelphia, acquired a branch plant and warehouse at York, Pa. The company recently purchased the precision ground tool steel business operated by Charles E. Rice Jr. at 101 E. Market St., York. Sandmeyer will install machining and cutting equipment for production of the firm's specialized stainless products.

Bendix Radio Expands Maryland Plant Site

Bendix Radio Div., Towson, Md., Bendix Corp., says it plans to double the capacity of its government products engineering building with a two story, 75,000 sq ft addition. The project will bring total floor space for engineering, manufacturing, and administration in the Baltimore area to more than 1 million sq ft.

GE in Water Research

General Electric Co.'s new Burlington, Vt., laboratory, managed by C. H. Ridgley, will investigate and develop advanced concepts of salt water conversion and also obtain operating data on GE's new thin-film distillation technique.

1 Billion cu ft Helium to Flow from Joint Venture

Plans for a plant at Liberal, Kans., to extract 1 billion cu ft of helium a year from natural gas have been announced by Panhandle Eastern Pipe Line Co., New York, and National Distillers & Chemical Corp., New York. Construction will be undertaken by a jointly owned company, National Helium Corp., starting in mid-1962. The federal government is under 20 year contract to take the company's total helium output.

Installs Painting Line

Marwais Steel Co. is installing a $1 million, continuous strip, paint coating line at its Richmond, Calif., plant. The facility will prepare and apply paint to one or both sides of steel and aluminum coils up to 50 in. wide and 0.065 in. thick. It will have a capacity of 400,000 sq ft per day.

Bohn Expands at Danville

An addition of dock space and raw materials warehousing is being made at the Danville Div., Danville, Ill., Bohn Aluminum & Brass Corp. The new facilities, bringing total space at Danville to 181,000 sq ft, will be in use by the end of the year. The Danville Div. produces heat transfer equipment for heating, air conditioning, and commercial refrigeration.

Forms Plating Department

Bunting Brass & Bronze Co., Toledo, Ohio, established a precision plating department. It will be equipped for close tolerance plating of sleeve bearings and other parts by the electrolytic or immersion process. Laboratory controls will permit accurate analysis of plating solutions and statistical test sampling of finished parts.

Rheem Div. to Have Lab

Rheem Mfg. Co., New York, will open its Home Products Div. Development Center for heating, air conditioning, and related equipment in Chicago around Dec. 1. The center, with 12,000 sq ft of laboratories, shops, and offices, will handle research for all plants in the division.

Adds Space at Houston

National Supply Div., Pittsburgh, Armco Steel Corp., has added more than 94,000 sq ft of floor space to its facilities at Houston. Included are sucker rod and drill collar buildings and an 80 by 200 ft warehouse. About 50 workers will be added to make and distribute oil field machinery and equipment.

ASSOCIATIONS

Cecil R. Garland, vice president and secretary-treasurer, W. O. Larson Foundry Co., Grafton, Ohio, has been named president of the **Gray Iron Founders' Society.** Other officers: Vice president, J. W. Simmons Jr., vice president and treasurer, Cox Foundry & Machine Co., Atlanta; secretary, R. E. Crowe, president and general manager, Crowe Foundry Ltd., Hespeler, Ont.; treasurer, Paul H. Scherf, executive vice president, Alten Foundry & Machine Works Inc., Lancaster, Ohio; and assistant treasurer, William F. Seelbach, vice president, Forest City Foundries Co., Cleveland.

Ford Licenses Firms To Make Titanium Carbide

Ford Motor Co., Dearborn, Mich., licensed Willey's Carbide Tool Co., Detroit, and Adamas Carbide Corp., Kenilworth, N. J., to manufacture and sell its patented titanium carbide material. It is used principally in cutting tools.

Aircoil Adds to Plant

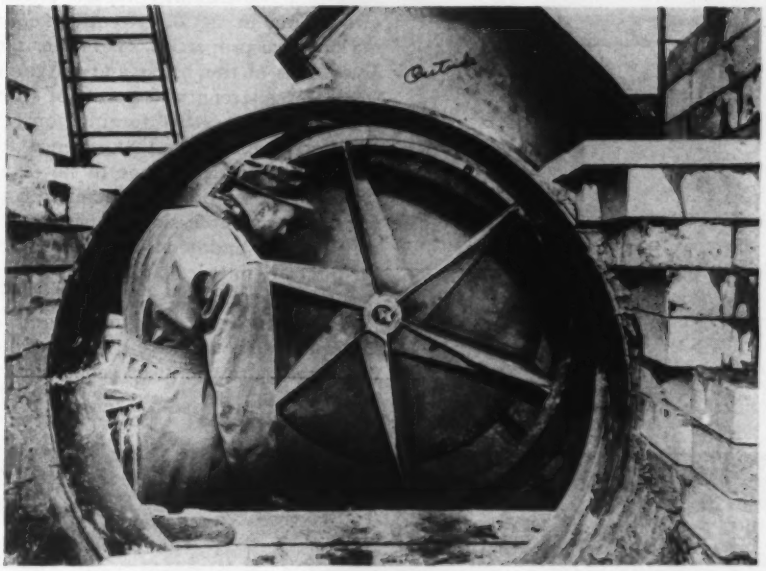
A 25,000 sq ft storage addition is being erected at the Jessup, Md., plant of Baltimore Aircoil Co., Baltimore. The firm produces evaporative condensers and cooling towers for air conditioning and refrigeration installations.

Ducommun Builds Branch

Ducommun Metals & Supply Co., Los Angeles, is building an office and warehouse costing $278,640 at Kent, Wash. J. J. Ray is manager of the Northwest Div. The company will soon merge with Barde Steel Co., Seattle.

Anaconda Forms Division

Anaconda Wire & Cable Co., New York, established a Utility Products Div. with Austin W. Dunham as manager. The division is responsible for marketing of Anaconda's line of utility products.



Other Fans Failed, Titanium Holds Up

INSTALLATION of a 49 in. titanium fan to exhaust corrosive gases cost Nassau Smelting & Refining Co., a division of Western Electric Co., $11,000, but the cost (which included the housing) was recovered in about 15 weeks and it's still saving the company money.

Prior to the switch to titanium, fans failed after about one week of operation. Each failure cost Nassau $1100 (materials, $400; downtime, $600; labor, $100).

The titanium fan was fabricated by Pfaudler Co., a division of Pfaudler-Permutit Inc., Rochester, N. Y.

NEW OFFICES

Kent Steel Products Ltd., Toronto, has started construction of a steel service center in Hamilton, Ont. The $500,000 facility will provide slitting, shearing, warehousing, and distribution services for a wide range of steel products.

Congdon & Carpenter Co., Providence, R. I., has opened a 30,000 sq ft metals service center in Natick, Mass.

Harvey Aluminum Inc. has opened a sales office at 103 Koch Bldg., Wichita, Kans. Miles Wilson is the manager.

Pacific Press & Shear Corp., Mt. Carmel, Ill., has opened a Chicago area sales and service office at 110 N. Spring St., La Grange, Ill. Jim McHugh is regional sales manager.

Eutectic Welding Alloys Corp., Flushing, N. Y., has created a National Accounts Div. to provide sales and services to large volume users of the company's products. Offices will be in all major industrial centers.

CONSOLIDATIONS

Consolidation of **Martin Co.** and **American-Marietta Co.** has been approved by stockholders. The resulting firm will be known as Martin-Marietta Corp. George M. Bunker, Martin chairman, becomes president and chief executive officer and Grover M. Hermann, founder and chairman of American-Marietta, will be chairman of the new board of directors. Martin-Marietta Corp. will have sales in excess of $1.2 billion.

STRIKING WHILE THE METAL'S HOT

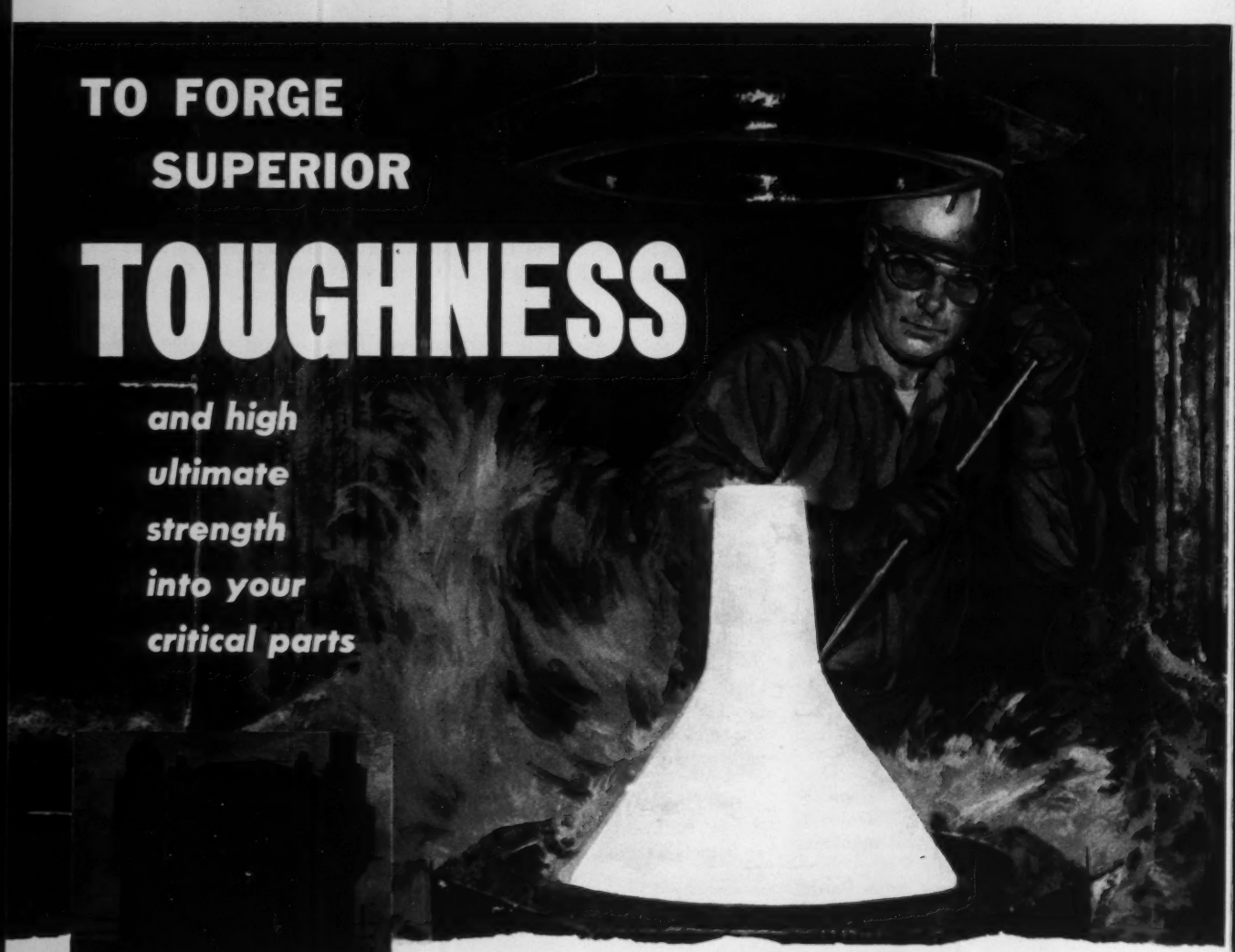
Here in fierce heat and pressure of the forging process is seen the literal birth of *endurance* in metal. No other method compares for preserving and improving physical properties. No other method refines metal structure to comparable levels of toughness and fatigue resistance—or provides like opportunity to reinforce strength at points of stress by control of grain flow.

Similarly, no other forging source offers the unique combination of capabilities, facilities and experience found at Wyman-Gordon. Here is the industry's broadest range of hot-working equipment—in hammer and press types, in closed-die forged weight and size capacity, in materials utilization. Here, too, is professional assistance in design and metallurgical problems—continuously updated by intensive research—providing significant contributions for aircraft, missile, nuclear, automotive, diesel, gas turbine, farm machinery and heavy equipment forging applications.

A Wyman-Gordon engineer stands ready to counsel on all such applications. He brings an invaluable backlog of field-and-laboratory data showing how to use forgings to the most economical advantage. His aid, while designs are still "on the board," can lead to lower end-use costs.

TO FORGE SUPERIOR TOUGHNESS

and high ultimate strength into your critical parts



EST. 1883

WYMAN-GORDON

FORGINGS

of Aluminum Magnesium Steel Titanium . . . and Beryllium Molybdenum Columbium and other uncommon materials

HARVEY ILLINOIS — WORCESTER MASSACHUSETTS — DETROIT MICHIGAN

GRAFTON MASSACHUSETTS — LOS ANGELES CALIFORNIA — PALO ALTO CALIFORNIA — FORT WORTH TEXAS

W02

SPUR FOR AUTOMATION—How to more efficiently control a machine is the subject of intensive mathematical research being conducted at RIAS Div., Martin Marietta Corp., Baltimore. Work has progressed to a point where practical designs are being based on such results, states Dr. Joseph P. LaSalle. Our mathematical progress in automation control theory is only on a par with that of Russia. Urgently needed: Closer liaison in this country between engineers and mathematicians. (RIAS would welcome year-long fellowships for industrial engineers.)

NEW AUTOMATION LINES—1. Two fully automatic lines to make explosive devices incorporate novel features to meter and compact powder, reports Universal Match Corp., St. Louis. They turn out 320 assemblies a minute. Inspection and rejection are also automatic. 2. A completely automatic uranium fuel processing line is being constructed for a Western atomic energy installation. Spent fuel elements will be removed, dismantled, and completely processed with no more human attention than remote observation.

PORTABLE THERMOELECTRICITY—A Navy "back-pack" that can develop 340 watts from propane or gasoline weighs only 36 lb, says Westinghouse Electric Corp., Pittsburgh. The device may have civilian applications.

IMPROVED ROCKET CASE—A high strength steel for rockets resists hoop stresses of 311,000 psi, says the developer, Pratt & Whitney Aircraft Div., East Hartford, Conn., United Aircraft Corp.

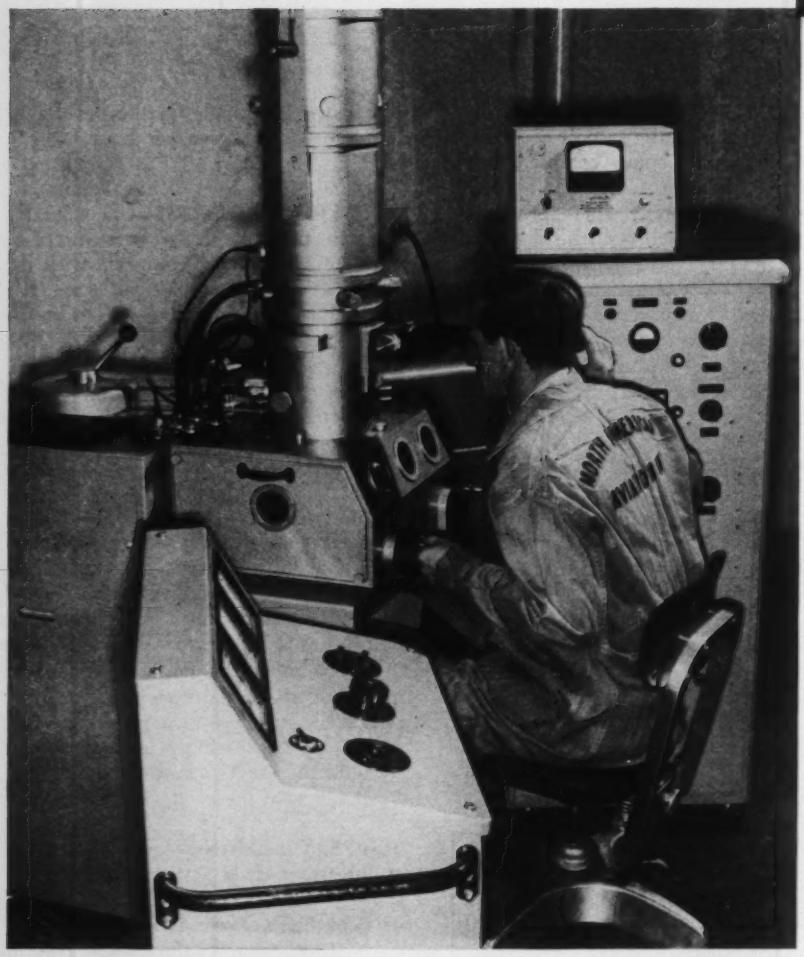
BEARING PROGRESS NOTE—"The surfaces of highly polished steel bearing balls are so fantastically 'rough' that friction peaks are ten times greater than those of sapphire bearings," states Dr. Lawrence Hafstad, vice president, Research Laboratories, General Motors Corp., Detroit. Research goal: Improvement in bearing performance first for missiles, then for earthly products. Explains Dr. Hafstad: Residual friction or misalignments in ball bearings are so small that drift rates in missile gyroscopes have been reduced to 0.001 degree per hour.

TUNGSTEN PROGRESS—Heating canned tungsten powders under pressure of 10,000 psi for 3 hours produces compacts with densities up to 98 per cent of theoretical, states Battelle Memorial Institute, Columbus, Ohio. Plasma sprayed tungsten shapes can be further densified by the procedure, called gas pressure bonding. Another idea being tried: Canned tungsten powder immersed in molten aluminum (1800° F) is blasted against surrounding forming dies by an explosive.

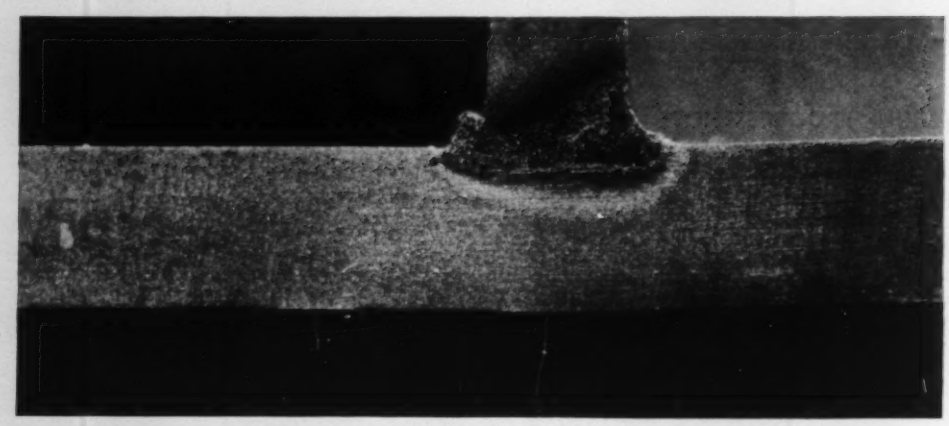
CRACK GROWTH STUDIED—Three principal phenomenons—surface energy, plastic deformation, and occasionally, chemical corrosion—are involved in crack propagation, states Dr. A. C. R. Westwood, RIAS Div., Martin Marietta Corp., Baltimore. Of those three, plastic deformation is the most important, he believes, and is more significant than thought previously. He has developed an impressive etch pit technique which locates and manipulates dislocations, permitting study of the exact path they take during stressing.

SLIPPERY BEARING—Liquid metals employed as lubricants do a better job in a magnetic field, states Prof. William T. Snyder, State University of New York, Long Island Center, Oyster Bay, N. Y. Load capacity depends on the electromagnetic boundary conditions entering through the conductivity of the bearing surfaces, he says. Such devices are called magnetohydrodynamic slider bearings.

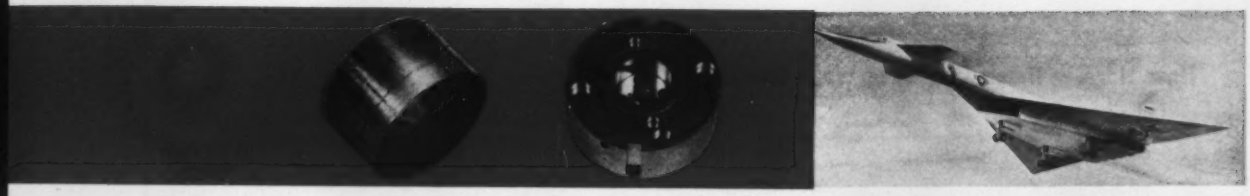
NEW VACUUM DEPOSIT SYSTEM—To replace molten metal baths for vacuum deposition, a new technique developed by M. S. P. Lucas, Duke University, Durham, N. C., employs an arc between zone refined electrodes of the metal to be deposited. Speed: 50 angstroms per second at 1.5 in. from the source. Mr. Lucas notes that the arc crept some distance up the side of the negative electrode rather than remaining strictly at the end.



North American technician operates the Hamilton-Zeiss electron beam welder



This double fillet weld produced with a single pass proves that metal refracts an electron beam. Control is so precise braze metal (below) isn't affected



Stator cores (left) for B-70 are welded without affecting magnetic efficiency. "Impossible" magnesium welds (center) really aren't difficult, says North American

Electron Beam Welding Key Tool in Making B-70

• **ELECTRON BEAM welding is one of the key tools for building our superplane, the B-70, says Gerald V. Anderson, North American Aviation Inc., Los Angeles.**

"We foresee a bright future for the technique," he told the Society of Automotive Engineers at Los Angeles. "Mechanical fasteners employed on slower planes are impractical for craft moving three times the speed of sound. Tolerances needed for the B-70 often preclude conventional welding. Electron beam offers us a way around difficult and expensive machining of solid pieces. That tremendously reduces costs," states Mr. Anderson.

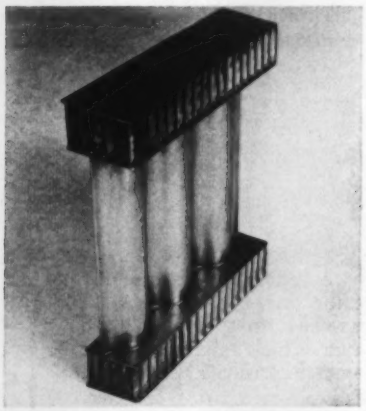
"We have made buttwelds in titanium foils only 0.00025 in. thick and steel 0.5 in. thick. We can drill 0.001 in. holes," he continues. His firm has ordered a vacuum chamber 10 by 3.5 by 3 ft to extend the usefulness of its electron beam guns.

Here are some examples of North American's work and some of its conclusions.

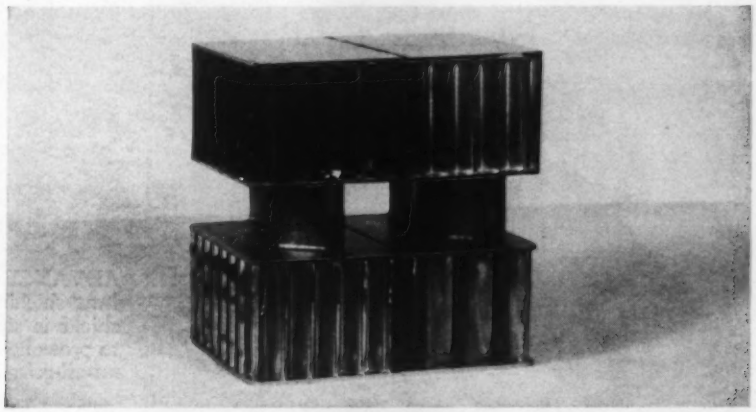
• **North American has evaluated the effects of voltage, beam current, and focal length.**

"It seems evident from our initial results that voltage plays the dominant role in penetration," observes Mr. Anderson. Variations of current have more effect on weld width.

More than 35 materials have been machined or welded at North Amer-

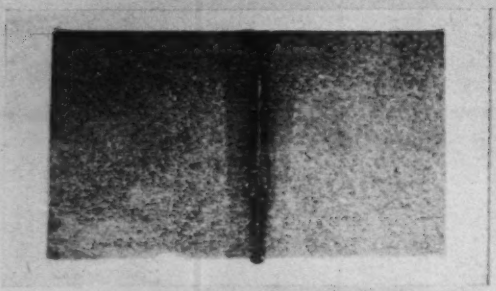


Difficult sine wave web can be joined in a single pass

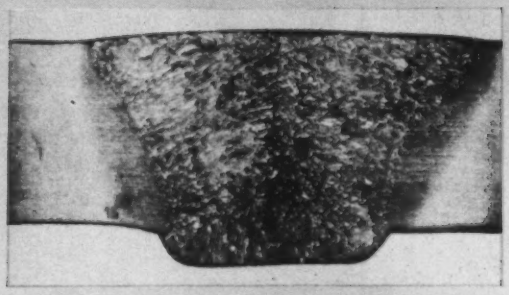


An electron beam buttwelded four face sheets of honeycomb panels in this mockup at North American, demonstrating control and versatility of the technique

How Narrow Beam Upgrades Weld Quality

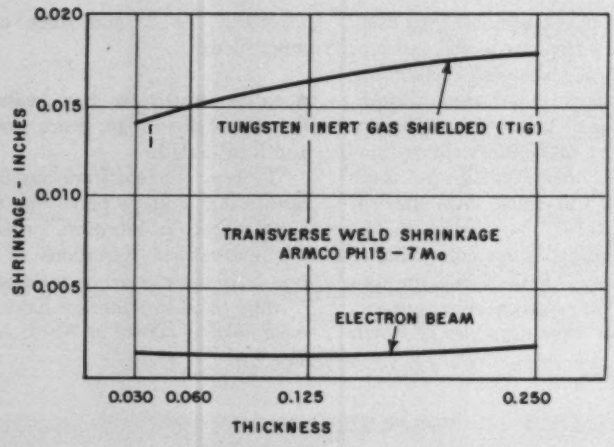


Exceptionally narrow heat affected zones are big feature of electron beam welds. Compare these welds . . . in 0.250 in. metal. The heat affected zone made by the Tig method is too wide to fit in the picture. Tensile properties in narrow weld are often equal to those of parent metal



"REMARKABLE" is what North American engineers call the tensile strength of electron beam welds in Armco PH 15-7 Mo stainless. In 0.250 in. metal, it's nearly equal to the parent metal. Graphs (right) compare electron beam results with those of the Tig method.

North American's explanation: 1. The heat affected zone in an electron beam is extremely

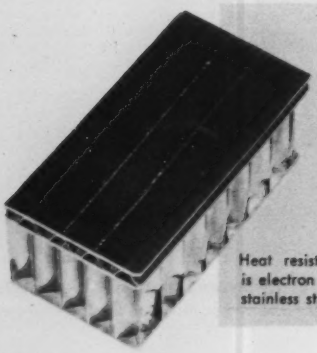


ican. The list includes various combinations of metals, from aluminum to columbium.

• Electron beam welds exhibit "remarkable tensile properties," says Mr. Anderson.

Preliminary weld data on Armco PH 15-7 Mo stainless (0.030 to 0.250 in. thick at speeds of 30 ipm) shows that as the thickness of the material increases the strength increases up to 0.250 in. At that level, the tensile value practically equals that of the base metal.

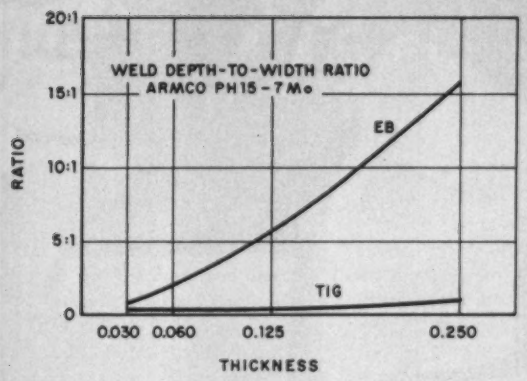
Samples joined by electron beam and tungsten, inert gas (Tig) methods have equal strength when the material is 0.030 in. thick; but the

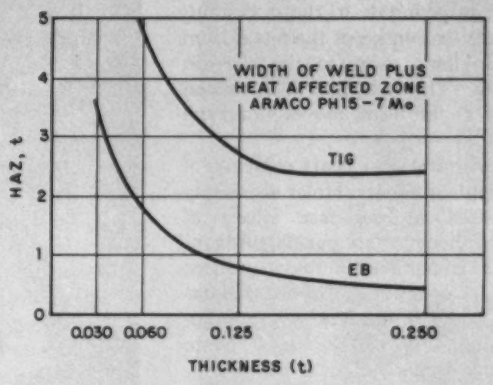


Heat resisting barrier of columbium is electron beam welded to a stainless steel honeycomb

Electron Beam Welds Fit Future Space Picture

ADVANCED space vehicles might employ heat shields like the one at left. The heat shield is simply welded to the honeycomb as protection. An air vehicle might consist of an all-refractory-metal corrugated sandwich,





narrow in relation to the thickness being joined. Since the narrow zone doesn't change dimensionally as thickness increases, the ratio gets larger and larger. Deformation is restrained by the adjacent unaffected parent metal.

Specimens heat treated after welding exhibit 100 per cent of the parent metal's tensile strength, the company reports.

electron beam method produces welds nearly 50 per cent stronger in 0.250 in. sheets.

North American attributes the strength increase to the heat affected zone (it is extremely narrow, and deformation is restrained by the adjacent parent metal) and to the weld width which is practically the same for all thicknesses of metal. (Unaffected parent metal exhibits a greater restraint on thicker pieces.) All specimens are uniformly strong throughout when they are heat treated, says North American.

• Precise control of an electron beam enables the joining of thick and thin members with almost no distortion of the thin member.

In constructing honeycomb panels, thin foils must be joined to comparatively thick face sheets. One example tried at North American employed a 0.006 in. foil and a 0.080 in. face sheet.

Company engineers noted a refracting characteristic of electron beams. Operators can work the device so that a beam producing a fillet weld on one side of a tee will bend under the foot of the tee, pass through the adjoining sheet, and produce a corresponding fillet on the other side.

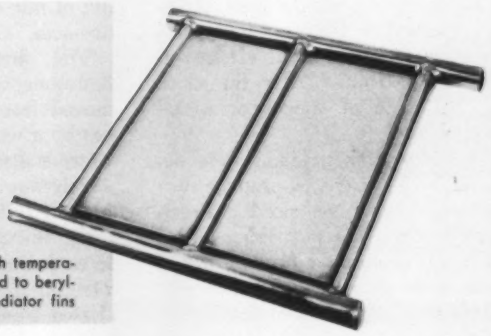
In a similar example, North American attached a 0.010 in. piece (edgewise) to a 0.006 in. honeycomb face sheet. Although it was welded from each (fillet) side, control was so precise that brazing metal wasn't melted on the inside of the honeycomb face sheet.

• Electron beams have tremendous energy densities, often greater than 25 million watts per square inch. Several widely separated joints can be welded at the same time if they lie in the same vertical plane.

To demonstrate that technique, North American welded sine wave webs (see illustration, Page 000) between two honeycomb panels. Buttwelds were then made in the four cover sheets simultaneously.

Here's what Mr. Anderson obsays North American.

Heat exchangers have been made of copper fins joined to Inconel tubing to extract heat from gases which flow through the tubes.



Proposed radiator has high temperature alloy tubes welded to beryllium radiator fins

served with a 40 power stereomicroscope. "The beam vaporizes a small hole in the center of the molten metal on each surface, allowing the beam to penetrate to the next joint. Surface tension keeps the metal from being blown away in the electron stream. The hole fills with molten metal as the beam moves along the joint."

Machining also bears evidence of tremendous energy. Holes are simply vaporized in the face sheets of brazed honeycomb panels. Advantages: Exceptionally smooth edges; no chips or residue. The beam diameter is 0.003 in., but a tape programing setup can be employed to produce larger holes.

North American's equipment was made by Hamilton Electrona, New York.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

Ribbon Looms Reduce Cost Of Narrow Wire Cloth

USE OF high speed, ribbon looms has substantially reduced manufacturing cost of woven-to-width wire cloth produced by Reynolds Div., Dixon, Ill., of National Standard Co.

Exact cost reductions depend on wire size, weave, quantity, finish, and the basic metal.

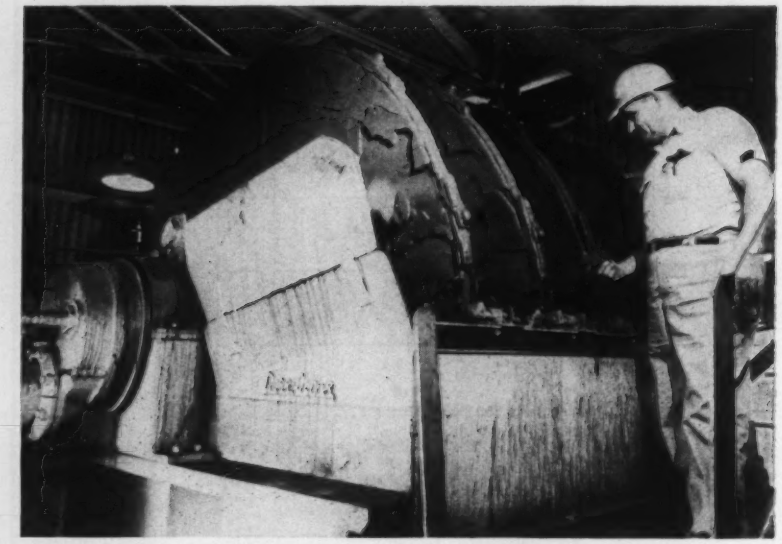
The division is increasing its capacity to produce industrial grades of wire cloth in ribbon widths—¾ to 8 in.

It's made in meshes 4 to 80, in appropriate wire sizes.

The narrow, wire cloth ribbon is often used for small parts, where a selvage, or safe edge, is needed on both sides.

The division offers such cloth in brass, copper, bronze, steel, stainless, and other metals. It can be painted, hot galvanized, electrogalvanized, or tinned. Or the cloth can be made of copper or nickel covered steel.

The new, ribbon looms were designed by Reynolds to produce narrow widths at high speeds. Previously, the cost of ribbon-width cloth was prohibitive because it had to be made on wide production machines.



Filter discs remove solids from sludge as . . .

Vacuum Unit Scores Assist In Dust Disposal System

• MORE ATTENTION is being given to the removal of suspended solids from water discharged by wet scrubber systems. Demand is increasing for settling and filtering equipment—for the disposal of undesirable fines (to prevent stream pollution) and for the reclamation of valuable process materials.

Example: A vacuum filter device and a thickener are teamed up to recover blast furnace flue dust from wash water at the Neville Island plant, Pittsburgh, of Pittsburgh Coke & Chemical Co.

• The system has more than enough capacity to handle peak output of flue dust from the company's furnaces.

The flue dust—a mixture of limestone, coke, and iron ore—is removed from the blast furnace offgas by a water scrubber. The dirty water is discharged into a thickener, which was supplied by Dorr-Oliver Inc., Stamford, Conn. After settling, the dust is carried in sludge form through a closed system to the vacuum filter, which was also purchased from Dorr-Oliver.

The filter can reclaim 150 tons of waste solids per day. That is considerably more than the daily carload which is processed when the stacks are operating at capacity.

• Water forced through filter cloths deposits suspended solids, which are dried and scraped free for reprocessing.

The filter consists of a rotating assembly of five discs, 8½ ft in diameter, covered with filter cloth.

At the bottom of rotation, filter discs pass through a pool of sludge. Vacuum forces water through the filter, while solids are deposited on the filter cloth. The vacuum continues to dry adhering sludge to a claylike consistency, as the filter moves toward the top of its rotation.

On the side of the assembly that is moving downward, the vacuum is replaced by air pressure. That causes the filter cloths to balloon and forces them against rubber knives, which scrape the sludge free of the cloth. Sludge is then discharged through a chute into a railroad car.

Tape Controlled Drill Priced for Wide Market

• "WE WANTED to produce a machine which would make it possible for every company in this country to get its feet wet in numerical control." That statement, made by Daniel C. McCarthy, executive vice president of Pratt & Whitney Co. Inc., describes the company's intent in pricing its new, two axis, tape controlled drilling machine at $8595.

Mr. McCarthy adds: "We know that every metalworking shop can use numerical control advantageously today. We know that few companies will be able to exist without it in the next decade. Until now, the price of numerical control has prohibited thousands of companies from replacing obsolete equipment."

• To keep costs down, P&W has committed more than $1.5 million to make the single spindle machine by mass production techniques. **(See Machine Topics, Page 68.)**

Paul N. Stanton, vice president-marketing adds: "We believe that the concept incorporated in the Tape-O-Matic drill will enable P&W to compete successfully on a world-wide basis."

• The Tape-O-Matic can drastically cut leadtime on large and small operations with present personnel.

The part is held to the positioning table with holding fixtures, riser blocks, and clamps. The unit positions both axes at once to an accuracy of ±0.0005 in. Jigs and jig design time are eliminated. Depending on the drilling operations, studies indicate that the unit can sometimes replace up to ten or more conventional drilling spindles.

• Floor to floor time can be trimmed drastically.

Floor to floor time can often be reduced as much as 30 per cent vs. that required on conventional drilling machines, especially when spotting had to be done on a jig borer.

With the correct tape in the machine, rejects and scrap from human error are almost eliminated. Requirements for inspection can be greatly reduced. In some instances, the tape control can handle jobs that couldn't be done before.

• Case histories illustrate types of savings.

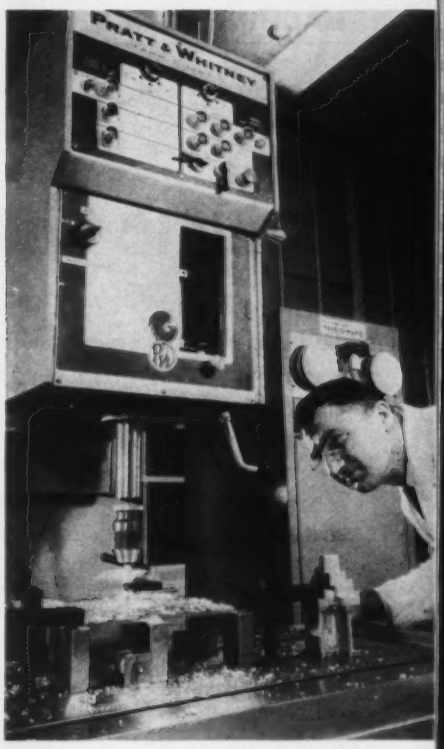
On a helipot drive bracket (cast iron) a Tape-O-Matic was justified by a 63.8 per cent reduction in floor to floor time. Fifteen pieces per year are handled in three job lots. In addition, the jig borer is now available for more jobs. Comparison: 1.16 hours per piece with conventional methods versus 0.74 hour on the Tape-O-Matic. Figuring on 250 such jobs during a year, the saving would be about $15,750 a year, says P&W.

Besides an 84.4 per cent reduction in the cost of production, the need for a costly jig was eliminated in machining a cast iron support bracket. The operation was based on 13 pieces per year in two lots. Conventional techniques required 2.82 hours per piece compared with 0.44 on the Tape-O-Matic. The company says 50 similar jobs would run up a saving of about $15,470.

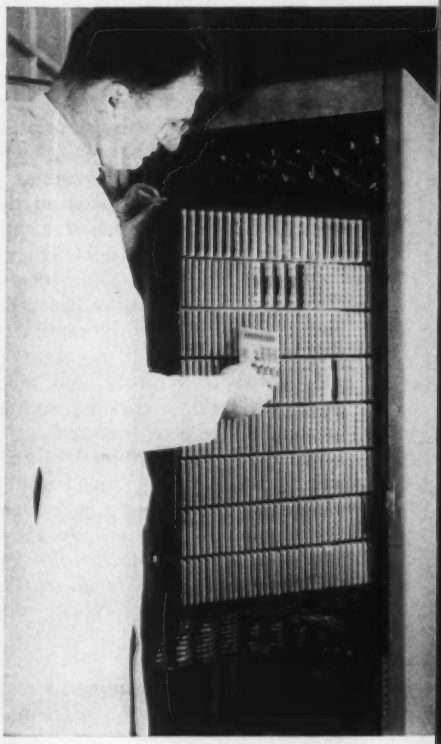
• The machine conforms to National Machine Tool Builders' Association and Electronic Industries Association specifications on control constructions, tape size, and tape reading.

Transistorized circuitry is used with modular construction. Benefits. Reliability and no moving parts. With only four varieties of circuit boards in the logic circuit, spare part stocking is simplified.

With full floating zero, the part can be clamped anywhere on the table, the zero set automatically, and the tape controlled operation can begin. Table working surface: 20 x 30 in.



Work is being done with the optional, automatic, repeat cycle cylinder



The operator is holding one of the four circuit board types

Volume Output Crops Machine's Price

To keep the tab on its new numerically controlled drilling unit under $10,000, Pratt & Whitney is going to mass produce and mass market it. The company plans to eventually turn out several machines daily

• **NEARLY EVERYONE knows that the machine tool industry uses a system that's nearly the epitome of short lot production. Machines are built 1, 5, or 20 at a time—generally in repetitive lots, although a few specials are built only once.**

You can make a convincing list of reasons for machine tools being produced that way, but at Pratt & Whitney Co. Inc., West Hartford, Conn., management takes another view.

The machine tool builder is spending more than $1.5 million to get into mass production on its new, Tape-O-Matic, numerically controlled drilling machine. (See story on preceding page.)

Daniel C. McCarthy, executive vice president, feels that real growth in the numerical control business is dependent, at least in part, on the ability of builders to sell it to the relatively small job shop. He has no doubt that much of the numerically controlled equipment to date has been too expensive for the small customers.

So Pratt & Whitney will mass produce ("we'll be counting output in numbers of machines per day") to achieve a mass market at a minimum machine price. Paul Stanton, vice president-marketing, points out that the P&W price is only about $400 over that of a similar, foreign-built machine with a much smaller (10 x 10 in.) table. "We're competitive world-wide."

• **The company is teaming its mass production plans with a mass marketing program.**

A year ago, P&W borrowed an idea from the auto industry—by announcing it would take used machine tools as trade-ins on new P&W equipment.

Mr. McCarthy, who came to the machine tool industry via marketing in the auto industry, says both distributors and direct salesmen will be keyed in on the new Tape-O-Matic machine and concept.

The machine will be backed up by:

1. A 90 day, money back guarantee. If it does not satisfy the user, it can be returned to P&W.

2. The company will offer a five year warranty against defective parts and workmanship.

3. The installment purchase plan will be offered.

4. The machines will be available via leasing, with or without the option to buy. For example, a five year lease on the Tape-O-Matic drill would run $190 to $200 a month.

• **The gearing up of production already is underway.**

"We're quoting about a three month delivery," says Mr. McCarthy.

The company's first three groups of machines will be in short lots—one of 10, one of 20, and one of 40 machines. Then the production line should be operating, and output no longer measured in lots. The first 11 machines produced will go back onto the production line.

As part of the production system, P&W will build its own printed circuit cards and many other electrical components.

• **A tape control service network should enhance the sales story.**

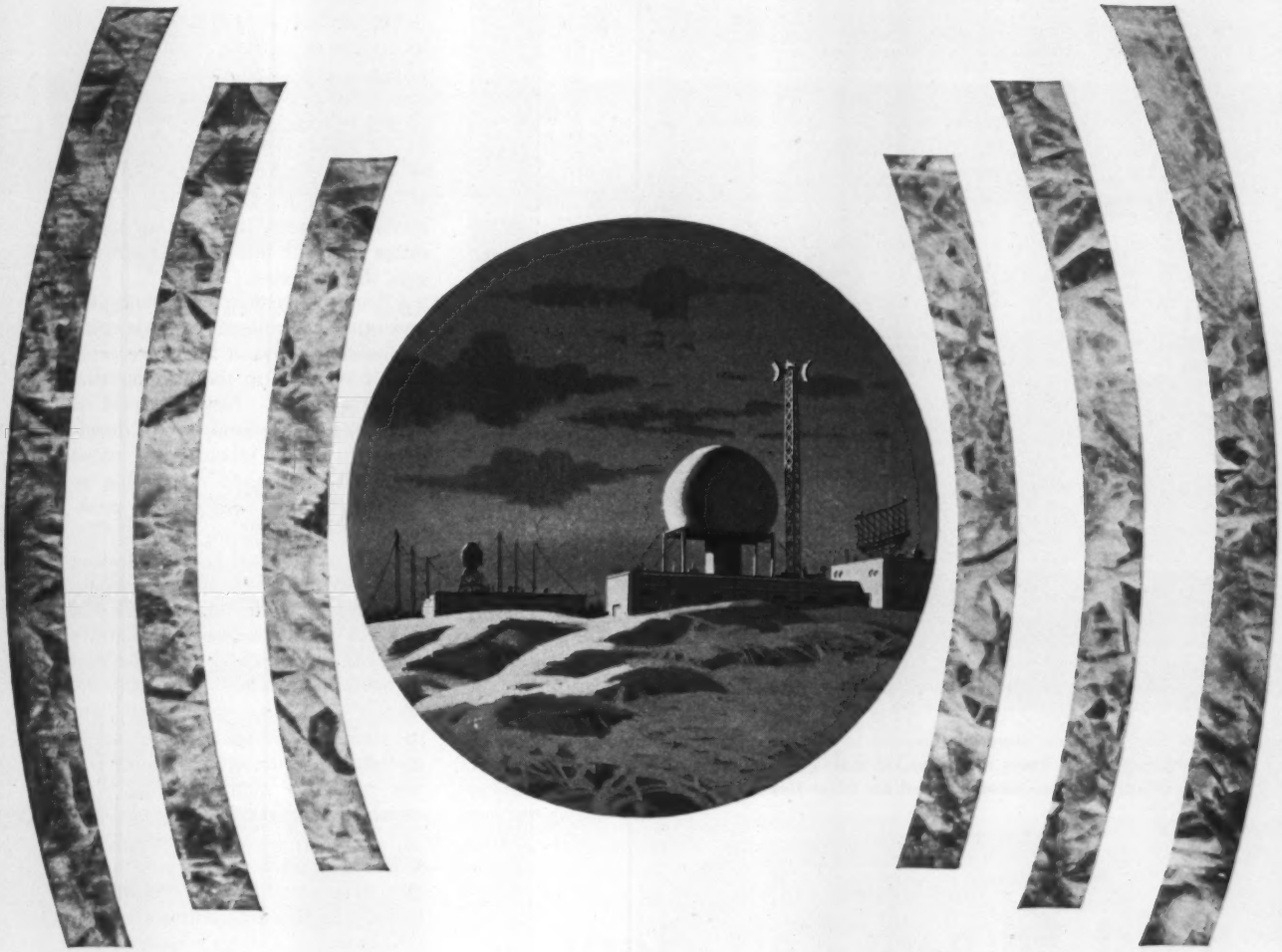
In co-operation with IBM's Data Processing Div., White Plains, N. Y., Pratt & Whitney also has announced Auto-Posit, a computer software package to aid in programing point to point numerical control. The deck of cards, to be used with the IBM 1401 computer, will be made available free to users of Tape-O-Matic.

Further, P&W is in the process of setting up programing facilities around the country for customer service. Simple programs will be handled on the spot. More complex programs, requiring computers, will be handled via Teletype to the West Hartford plant. The goal is 24 hour service.

Heads Distributor Group

NEWLY elected president of the American Machine Tool Distributors' Association is Irvine B. Rabel, president, Star Machinery Co., Seattle. For the past year, Mr. Rabel has been the association's vice president.

U.S. Air Force DEW-Line buildings fend off corrosion . . .



GUARDED BY GALVANIZED STEEL

Galvanized steel sheets—over 300 tons—will fill a vital need in the construction of unique air terminal/storage buildings for our Air Force's DEW (Distant Early Warning) Line.

The need? Maximum strength plus a defense against the DEW Line's dew point. Based north of the Arctic Circle, these buildings and their interior warmth will abut against bitter outside cold to create a temperature differential up to 130°—and a condensation-corrosion threat as extreme as the −60° surroundings. To eliminate the threat, each building will consist of: insulated galvanized steel floor construction, galvanized steel for outer skin of sidewalls, galvanized steel for inside (vapor barrier) face of sidewalls.

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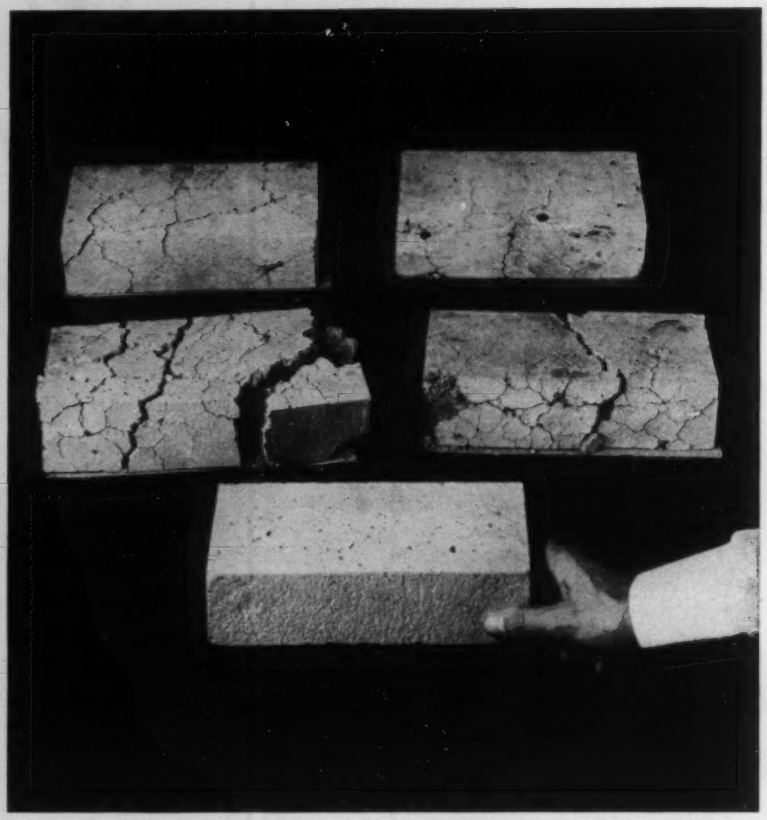


Low iron, castable material (bottom) is not changed appreciably in structure or strength after 40 hours in carbon monoxide environment at 900° F. It's reported that other castables recommended for blast furnace service show severe breakup

Blast Furnace Refractory Resists Carbon Monoxide

• A carbon monoxide resistant, castable refractory could be a boon to blast furnace operators.

The material is said to offer longer lining life, less downtime, low cost application, and low material cost. It's a product of the Refractories Div., New York, of Babcock & Wilcox Co.

• Resistance to carbon monoxide disintegration is documented by laboratory tests.

Tests by independent laboratories —to standards of the American Society for Testing & Materials (AST&M)—were said to demonstrate a wide disparity in the carbon monoxide resistance of various castable refractories.

Samples of various materials were preheated in normal atmospheres at 1750° F, as specified by blast furnace operators, before testing in carbon monoxide at 900° F. After 40 hours in the carbon monoxide environment, the newly developed material was said to show no significant change in structure or strength. But samples of several conventional castables, recommended for blast furnace service, were said to disintegrate or show severe breakup.

The ability of the new material to endure a carbon monoxide environment is attributed mostly to the use of a low iron aggregate and a high alumina, hydraulic cement binder developed by the division.

• Low rebound loss insures a high quality furnace lining and minimizes costs of labor and material, says the company.

Effects of particle size, plasticity, and other variables in castable composition on rebound loss were carefully researched in the development of the material. New methods of determining rebound were developed in B&W laboratories; those methods later made it possible to control rebound loss in the product.

Reduced rebound loss in gunning the material (10 to 15 per cent vs. 40 per cent with other castables, says B&W) helps insure uniformity and other desirable characteristics in monolithic linings. (Excessive rebound of heavier particles is said to alter the composition of many materials, so the gunned lining is less refractory than the mix with which it was made.)

• Easily applied with a wet or dry gun, the castable can endure extremely high temperatures.

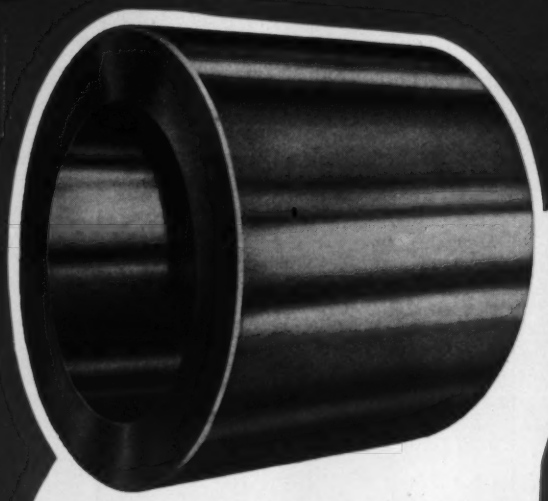
Constituted for pneumatic application, the material can be applied by wet or dry gunning. Careful grading of highly calcined base materials is said to minimize rebound loss from dusting with a dry gun. And good workability is said to be maintained for wet application.

The new castable is said to have extremely high strength and density, good thermal shock resistance, and good dimensional stability. The fusion point is 3135° F, and the material is recommended for use at temperatures up to 2800° F. Resistance to disintegration isn't confined to carbon monoxide environments; the refractory is said to withstand other reducing atmospheres.

• Low application cost and appreciable reductions in furnace downtime are given much of the credit

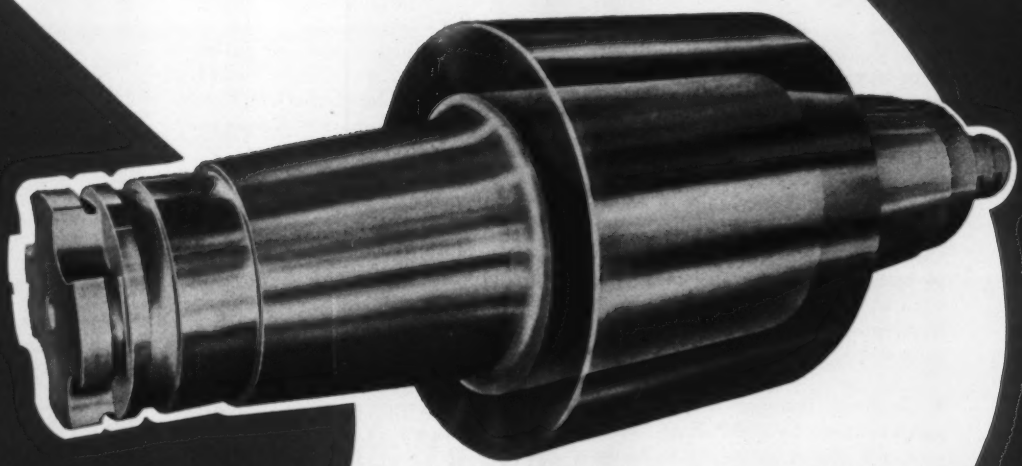
MESTA

BACK-UP ROLL SLEEVE SERVICE



FORGED STEEL OR CAST IRON SLEEVES

CAST OR FORGED ALLOY STEEL ARBORS



BACK-UP ROLL BODY SLEEVES MOUNTED ON ARBORS

Forged Alloy Steel and Cast Alloy Iron Back-Up Roll Body SLEEVES mounted on New or Used Cast or Forged Alloy Steel ARBORS

Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA

Minimum rebound loss in gun application is said to give the monolithic lining almost the same composition as the mix with which it is made

for increased use of castable refractories.

Economic advantages of gunned refractories have been demonstrated in extensive repairs made on blast furnaces. Interim repairs of gutted stack linings have reduced lining cost per ton of steel. Major repairs in bosh, in-wall, and topwall sections have been applied by gunning in a few days vs. several weeks required for rebricking.

Improved castables, with high carbon monoxide resistance, low rebound loss, and use limits of 2800° F or higher, may extend lining life still more. And it may be possible to apply such materials—making a complete monolithic lining—in a fraction of the time required to brick up a furnace.

• Constant increase of hot blast temperatures—to 2000° F or higher—causes greater attention to be focused on refractories.

Use of carbon monoxide inside the blast furnace to reduce ferrous materials in the charge—and the growing use of supplementary fuels—increase the severity of refractory wear. Research has shown that when carbon monoxide comes in contact with iron oxide—in the presence of certain iron compounds in the refractory, at temperatures of 750 to 1300° F—those iron compounds acquire additional oxygen from the carbon monoxide. Carbon deposition in the refractory structure is said to cause eventual disintegration of some refractories.

Steel producers and refractory manufacturers (working with AST&M) have adopted a standard test for carbon monoxide disintegration. The test has helped produce brick with a high degree of resistance to carbon monoxide attack (because of its low iron content) for use in blast furnaces and other reducing atmospheres.

Low iron content is also given much of the credit for the carbon monoxide resistance of B&W's castable.

Room Within a Room Cleaner than Clean

• NEW STANDARDS OF cleanliness will be met by a room within a room, says Stuart L. Parsons, general manager of the Lansdale, Pa., equipment manufacturing operations of Philco Corp., Philadelphia. The "whiteroom," now the ultimate in cleanliness, is becoming obsolete, he believes.

During the first decade of semiconductor manufacture, whiterooms provided adequate control of the manufacturing or assembly environment, Mr. Parsons comments. They were suitable while production areas were small, traffic was restricted, and the process was not changed. But tougher problems are posed by advances in production and the tighter requirements of solid state technology.

The cost of the whiteroom is another problem. Recent evaluations show that the cost of putting one in by modifying a building approaches that of the production equipment it contains.

• An effective way to meet the problem is the establishment of "cleanrooms" with smaller whiteroom areas within them.

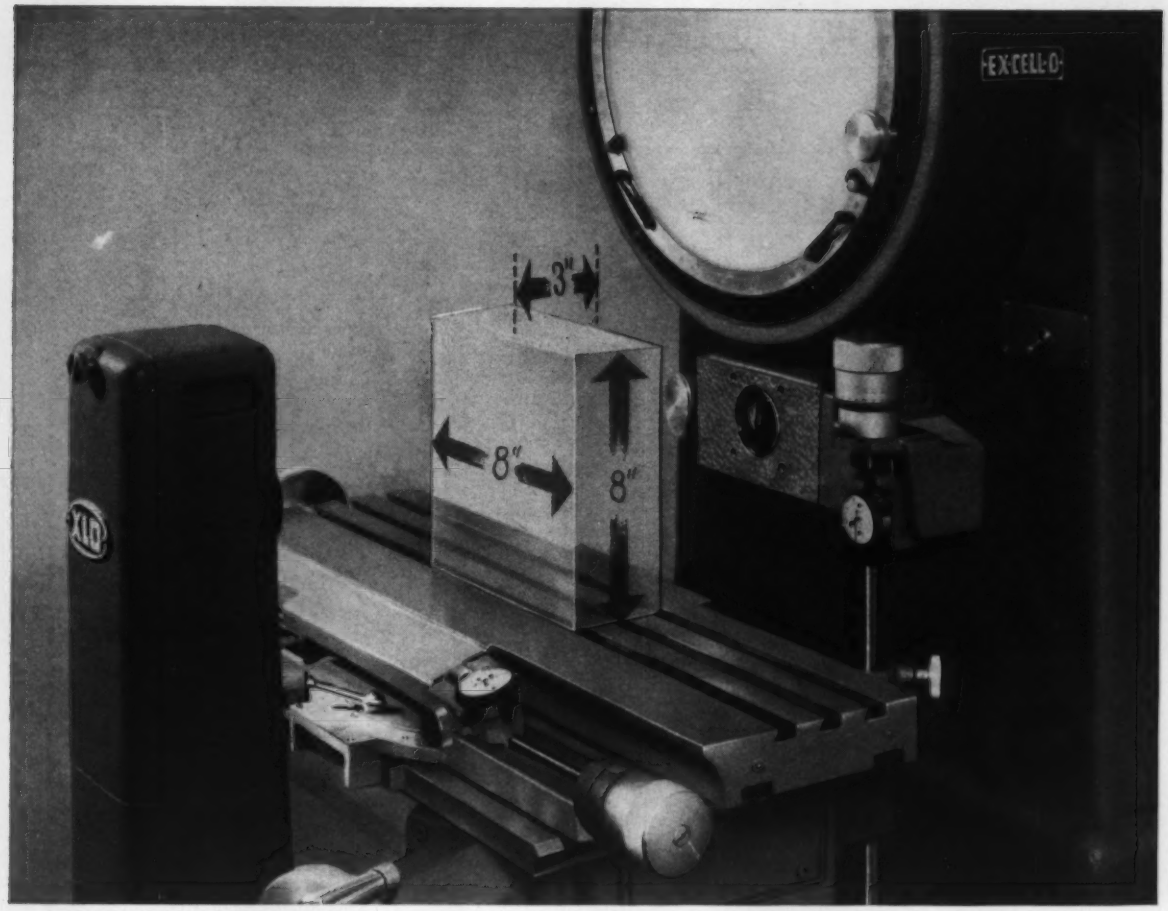
The cleanroom will have provisions for the control of temperature, humidity, and dust; it will be under positive pressure. Requirements for cleaning, head covering, air locks at the entrances, and gelatin pads will be reduced. Overhead ducts and supply lines can be open, rather than enclosed in a false ceiling, so that access will be easier.

Within the cleanroom will be such units as dry boxes, vacuum ovens, and dust shields in appropriate areas. Closer control of the most critical parts of a process will still be attained via whiterooms, but they will be inside the cleanrooms.

The outer environment of the whiterooms will be well above the usual levels in cleanliness, further reducing the possibility of contamination within the supercritical areas.

A number of industries require such superclean areas, Mr. Parsons notes. He names manufacturers of gyroscopes, ball bearings, and pharmaceuticals. Atomic research is another area.

Within the dual purpose concept, Philco has designed modular units for atmosphere control. They will be attached to appropriate services, simplifying installation. The modules are mobile—they will be rearranged when production processes or plant layouts are changed.



EX-CELL-O Contour Projectors Give You 98% More Capacity

Ex-Cell-O Models 14-5 and 30 give you capacity to accept and optically gage much larger parts than is possible with other contour projectors,—*and without repositioning on the table!*

A full 8″ of table travel in both horizontal and vertical planes, together with 3″ of focusing travel is standard on these Ex-Cell-O Models. Every point within this "block" can easily be brought into focus on the screen.

Here is real capacity,—192 cubic inches,—98% *more* than the nearest standard model! Enables users to stage shafts 16″ in diameter, (and larger in some cases), and 16½″ in length on the standard work table with standard centers. Any point along the part contour can be optically gaged with convenient table movement.

"Cubage" isn't the only Ex-Cell-O capacity Plus! You get constant 8″ of working distance (lens to focal plane) —20% more than other standard projectors. Full 8″ of vertical measuring travel. Constant throat clearance, (collimator lens to front projection lens), of 17½″ on the Model 14-5; 16″ on the Model 30;—and Ex-Cell-O's rugged, heavy duty tables enable you to stage parts weighing up to several hundred pounds.

When you are ready to talk about Contour Projectors, compare feature for feature! There is an OGP Representative near you to demonstrate Ex-Cell-O's many PLUS values. Call or write. In the meantime, let us send you "43 Reasons Why EX-CELL-O Contour Projectors are the First Choice of Industry."

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Manufactured by EX-CELL-O Corporation at Detroit, Mich.

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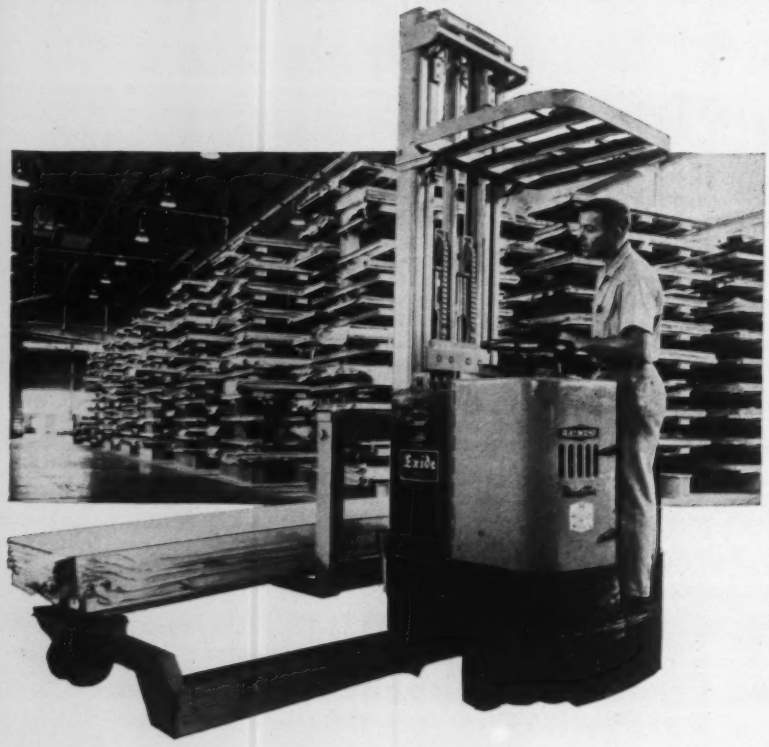
Space Saved in Sheet Storage, Handling

Lift trucks move sideways in narrow aisles, forward in wider passages



• A COMPACT storage area served by multidirectional lift trucks saves floor space and speeds the filling of orders for stainless steel sheets at the Stainless & Strip Div., Louisville, Ohio, of Jones & Laughlin Steel Corp.

The division aims for 24 hour service, but many items are shipped 3 to 4 hours after receipt of orders.

• Individual racks for different sizes facilitate inventory control and speed deliveries.

Sheets from the production area are resquared, inspected, and loaded on wooden skids in 5000 lb lots. Standard sizes are 36 by 96 in., 36 by 120 in., 48 by 96 in., and 48 by 120 in. Small quantities of odd sizes are also stocked. All sizes are available in thicknesses of 0.018 to 0.141 in., in a variety of finishes. Result: Many individual lots must be available for shipment.

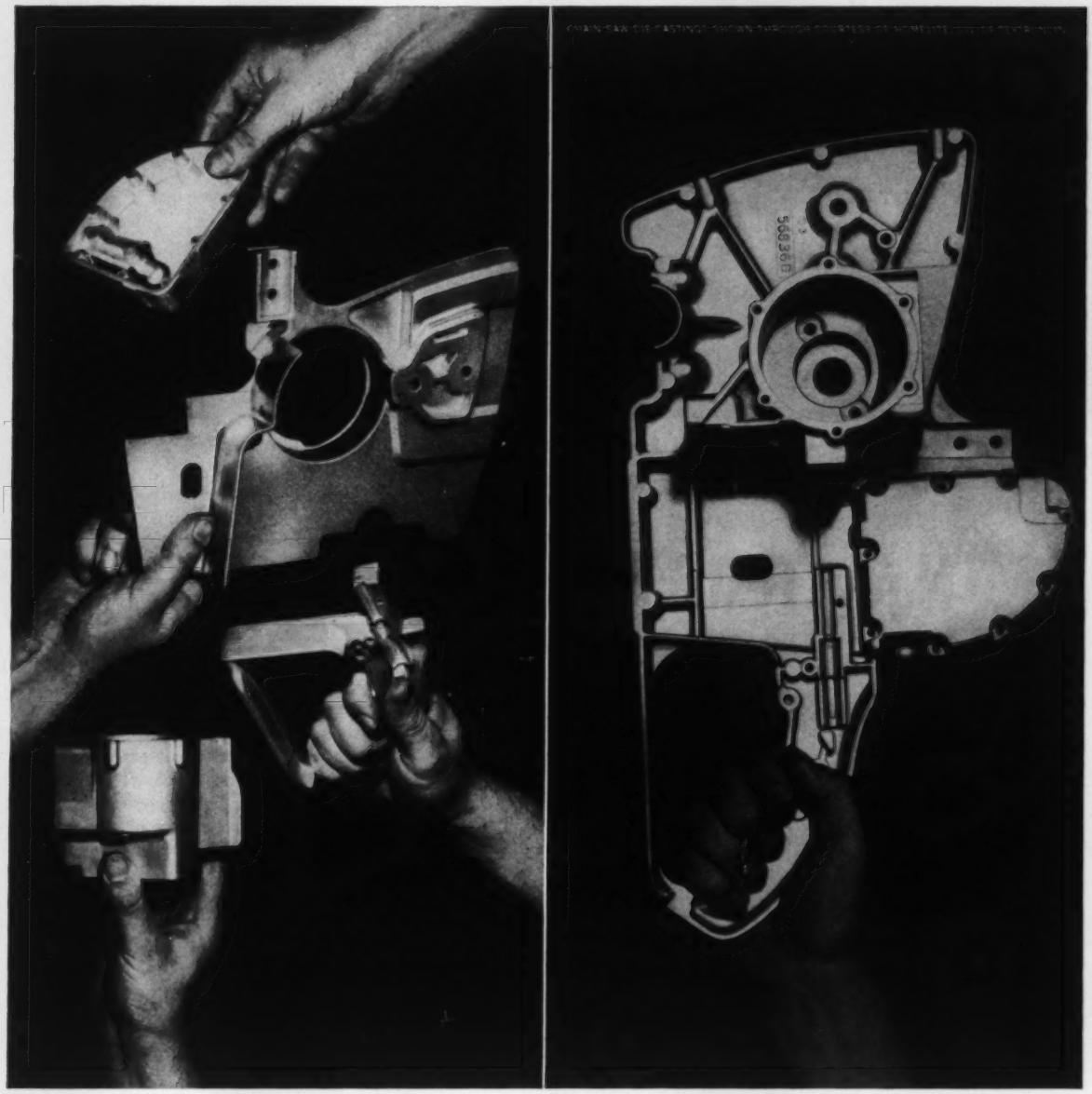
Double cantilevered racks, ceiling high, provide ten storage slots on each side of 9 ft 6 in. aisles.

• Trucks that can move in four directions service the narrow aisles.

Heavy duty, electric trucks that can be maneuvered in the narrow storage aisles were supplied by Raymond Corp., Greene, N. Y.

The lift trucks move forward in a main service aisle, carrying bundled steel on the forks. On arrival at the assigned area, operators reposition wheels with hydraulic control systems, so trucks can move laterally, with their loads, into the narrow aisles. Trucks can enter passages only 12 in. wider than the length of truck and load, since no space is needed for turning.

Stopping at the designated storage tier, operators raise loads to shelf height, reposition wheels for forward travel, and place bundles in the racks. Trucks are then backed away from the tier and moved laterally into the wider service aisle.



Multi-part assembly... or "assembly in the die?"

WHICH PROVIDES THE COST-CUTTING EDGE FOR YOUR PRODUCT?

If your product involves the assembly of two or more related metal parts, the chances are you can make important savings and a better product by having assembly "done in the die." Skilled one-piece die casting by Doehler-Jarvis cuts tooling and metal costs to the bone . . . saves you time and money at every assembling and joining stage. You save on rejects, too — in one-piece die casting, there are no such things as mismated parts. We call it UNITATION . . . the unique Doehler-Jarvis combination of unitizing and automation that produces the part you want in a single, strong casting. To learn how you can benefit from UNITATION, why not let an experienced D-J engineer take a hard analytical look at your cast, formed or assembled metal parts. His suggestions may save you thousands of dollars. Write or call.

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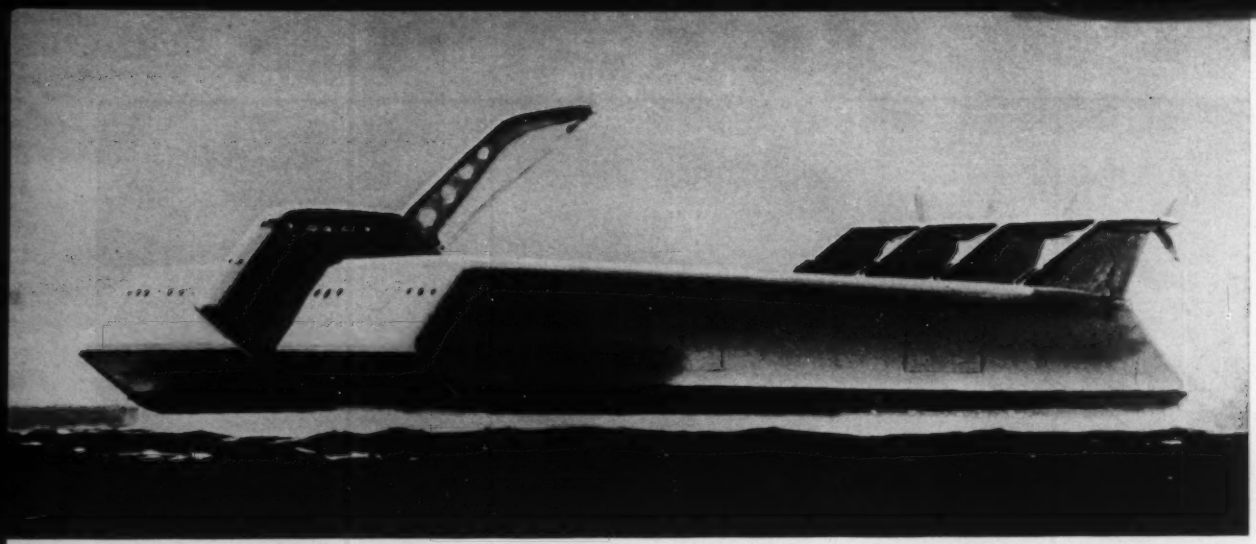
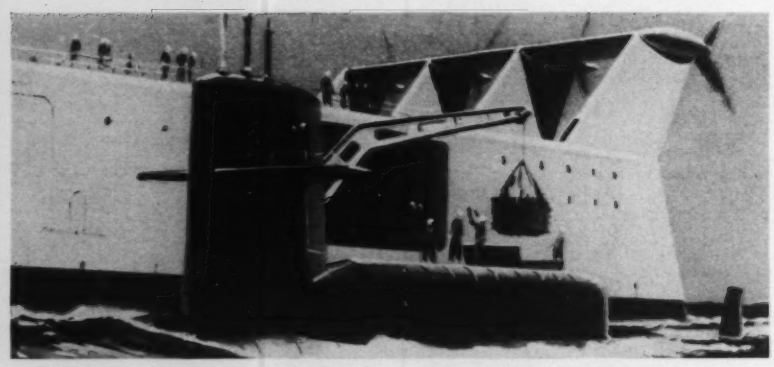


Cargo ships that ride over water could revolutionize sea travel . . .

Navy Tests 100 Knot 'Air' Ships



Our atom subs will be much less vulnerable when serviced by cargo ships like these. From our bases, any rendezvous could be reached in 10 hours

• SHIPS WITHOUT HULLS may soon carry heavy cargoes more than 2500 miles in one day.

Such vehicles (called ground effects machines—GEM) are more than a dream, claims Donald W. Douglas Jr., president, Douglas Aircraft Co., Santa Monica, Calif. His firm has just been awarded a $375,000 contract to build and study 200 ton prototypes.

• Preliminary studies indicate such machines could compete commercially with helicopters and hydrofoils. They are not as economical as conventional ships nor as fast as airplanes. But GEMs have some of the desirable characteristics of both.

"These new vehicles are aircraft which fly close to water or ground," explains Mr. Douglas. The larger they are, the more economical they become. Straightforward designs with low profiles permit low construction costs, he states.

Large fans create pressures in an open bottom, boxlike arrangement beneath each vehicle. Pressures of only ¼ psi, or about 36 lb per square foot are enough to support 1000 ton vessels at average heights of 3 ft. Conventional airplane type propellers move the machines at 100 knots an hour.

"Efficiencies of GEM (horsepower per ton) lie directly between conventional ships and aircraft. Horsepower per ton requirements are less than half those of a helicopter," claims Mr. Douglas.

Such craft are ideal for a wide variety of Navy requirements. As cargo carriers, costs per ton mile are competitive with conventional methods when you consider the enormous investments in convoys, escorts, and potential losses to enemy submarines. GEMs don't create water noise and can't be tracked.

GEMs would also make ideal aircraft carriers since their speed is about equal to the landing and takeoff speed of today's planes.

• The promise of these vehicles can't be overlooked, but many problems must still be solved."

The best underside shape to gain lift yet handle rough water and wave impacts is a long way from realization, Mr. Douglas points out. Rough water capability is the toughest problem being faced. Spray and corrosion problems, larger engines, static and dynamic stability and control are others.

One important need: A regenerative engine which combines light aircraft technology with the operating economy of large, stationary powerplants.

New Flux Offers Foundries Better Cupola Operation

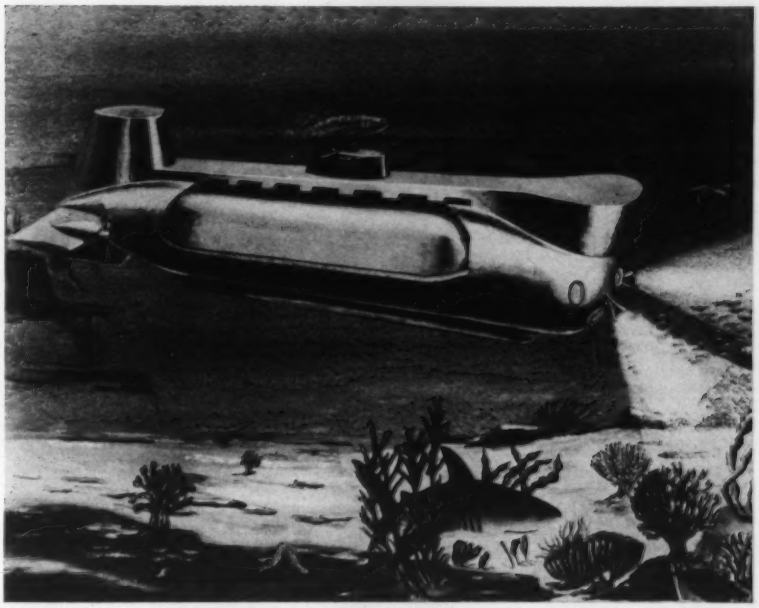
ADVANTAGES of more fluid metal in acid and basic cupola melting of gray or ductile iron are said to be available without initial cost, through the addition of a new flux, called foundry carbide.

The flux, produced by Union Carbide Metals Co., New York, a division of Union Carbide Corp., is said to improve castability and make for more complete slag separation. Castings are reported to contain fewer gas defects, chilled corners, and unsound spots.

• **Increases Temperature**—Iron in the cupola is heated 50 to 60° F by a 1 per cent (by weight) addition of the flux. A 2 per cent addition provides a 100 degree temperature rise. High temperatures produced by the flux during melting improve cupola operations and economics, says the producer. They help eliminate bridging and insure trouble-free melting. Less silicon and manganese are oxidized, so analysis control is improved. And absorption of more carbon from the fuel bed makes it possible to charge larger amounts of steel scrap and other low cost materials.

The addition of 4 per cent foundry carbide to the coke bed and the first two iron charges increases the temperature of the first iron tapped as much as 100 degrees. Such hot startups make the first iron fluid enough to be poured into castings —it needn't be pigged. Use of 2 per cent foundry carbide throughout the heat causes iron temperatures to recover rapidly after shutdowns.

• **Ductile Iron Application** — The flux is also beneficial in the production of ductile iron. It is said to improve desulfurizing power of basic cupola slags by increasing their basicity, lowering iron oxide content, and increasing temperature. It increases the sulfur holding capacity of acid slags slightly. By increasing iron temperatures, the flux is said to allow heavy desulfurization by calcium carbide injection or soda-ash ladle additions, without making the iron too cold to pour.



Aluminum Sub to Probe Deep for Minerals, Oil

• **AN ALUMINUM submarine will be used to probe a virgin treasure house of minerals, oil, chemicals, and food sources in "inner space."**

(Some expeditions have reported that chunks of manganese the size of grapefruit can be found in great quantities in some areas of the ocean floor.)

Financed by Reynolds Metals Co., Richmond, Va., the 50 ft long machine will operate at depths down to 15,000 ft, permitting exploration of 60 per cent of the ocean floor. Cost: $2 million, says the builder, Electric Boat Div., Groton, Conn., General Dynamics Corp.

The firm expects to prove a point with the vessel: Aluminum has important potential in ship and submarine hulls.

• **The hull is made by bolting together 11 forged aluminum cylinders, each 40 in. long, 6.5 in. thick. Ingots have already been cast.**

Twin propellers move the sub at 3.8 knots an hour. A top mounted screw accelerates ascent and descent. Other features include underwater TV, sonar, radio, telephones, and mechanical arms for retrieving specimens.

Aluminum alloy 7079-T6 was chosen because it is light and has a yield strength of 60,000 psi, states J. Louis Reynolds, chairman, Reynolds International Inc., a subsidiary of Reynolds Metals Co. The hull is thick enough to withstand tremendous pressures yet light enough to stay afloat without external aids.

Woods Hole Oceanographic Institution (Mass.) will operate the vessel under a research program sponsored by the Office of Naval Research. Most of the construction costs for the craft will probably be recovered through leasing arrangements, states Mr. Reynolds.

WHAT IS A CRANE FOR, ANYWAY?

To handle I-beams. Or castings or machinery or ingots or tanks. Or any of a thousand other things. But mostly to help keep production costs down and profits up.

Products of production in countless variety are handled safely and efficiently by Shaw-Box overhead traveling cranes. Built by Manning, Maxwell & Moore in every type and capacity needed for specific load handling jobs, they help all kinds of businesses save money and make money.

Shaw-Box cranes are seen at work in so many places for other sensible reasons. MMM has the know-how and crane building facilities to solve any load handling problem — and pioneered many innovations that are now standard practice in the crane industry. Today Shaw-Box cranes with pre-engineered and standardized components are a revelation in low first cost and upkeep. And, they have structural and functional plus values that add even more in long-term economy.

Whatever your plans call for in a crane, you will find it well worth knowing all the plus values Shaw-Box cranes have to offer. We invite your inquiry.

MANNING MAXWELL & MOORE INC. TRADE MARK

SHAW-BOX® CRANES

A product of

MANNING, MAXWELL & MOORE, INC.

Crane & Hoist Division • Muskegon, Michigan

Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

Wider Adhesive Use On Autos Predicted

ADHESIVES ARE highly regarded by automakers as a way to build a better car with lower weight and at less cost, says James R. Love, body stress and weight analysis engineer, Chrysler Corp., Detroit.

Mr. Love figures it's unlikely that any future car will be all-adhesive bonded—in critical areas which affect passenger safety, welding is still the best method. Nevertheless, he predicts that adhesives will be increasingly important in the next ten years.

• **The Reasons** — Mr. Love lists some key points of adhesive bonding:

"A properly bonded joint distributes the stress over the entire joint, eliminating the stress concentrations associated with bolting, riveting, and spotwelding. This may permit the use of lighter gage materials.

"Dissimilar materials, difficult or impossible to join by ordinary methods (plastics to metal, for example), may be joined by adhesives.

"Also, in the case of dissimilar metals, the adhesive bond provides a nonconductive insulator between the two materials, eliminating the possibility of electrolytic corrosion.

"The continuous contact between the mated surfaces provides a seal as well as a structural tie.

"Adhesive bonding allows structural members and reinforcements to be glued directly to the exposed panels. Spotweld dimples, which require metal finishing or create sun bursts on painted surfaces, are no longer a problem.

"The film of certain adhesive materials provides a measure of vibration damping between the adherents, increasing fatigue life and lowering the sound levels.

"Curing temperatures for adhesives, which are between 200 and 500° F, are considerably lower than those encountered in welding operations. Warping and loss of heat treatment are minimized."

Mr. Love adds that full use of adhesives has to await new developments in tool processing and adhesive formulation, as well as the continuous co-operation between the designer and the laboratory.

STEELMAKING AT JESSOP

Survival? It could depend on a 3,000-mile picket fence

Ever-vigilant sentinels against surprise attack are the radar installations along the DEW Line. Stretching 3,000 miles across Canada and Alaska, this electronic fence is our first line of defense.

At bleak, lonely outposts Air Force and civilian technicians watch for tell-tale blips on radarscopes—Distant Early Warning of the possible approach of enemy aircraft or missiles.

This all-weather system must withstand the worst of the elements—sub-zero temperatures, high velocity winds, rain, snow and ice storms common to the Far North. And dependability of the equipment could determine whether or not we survive an attack.

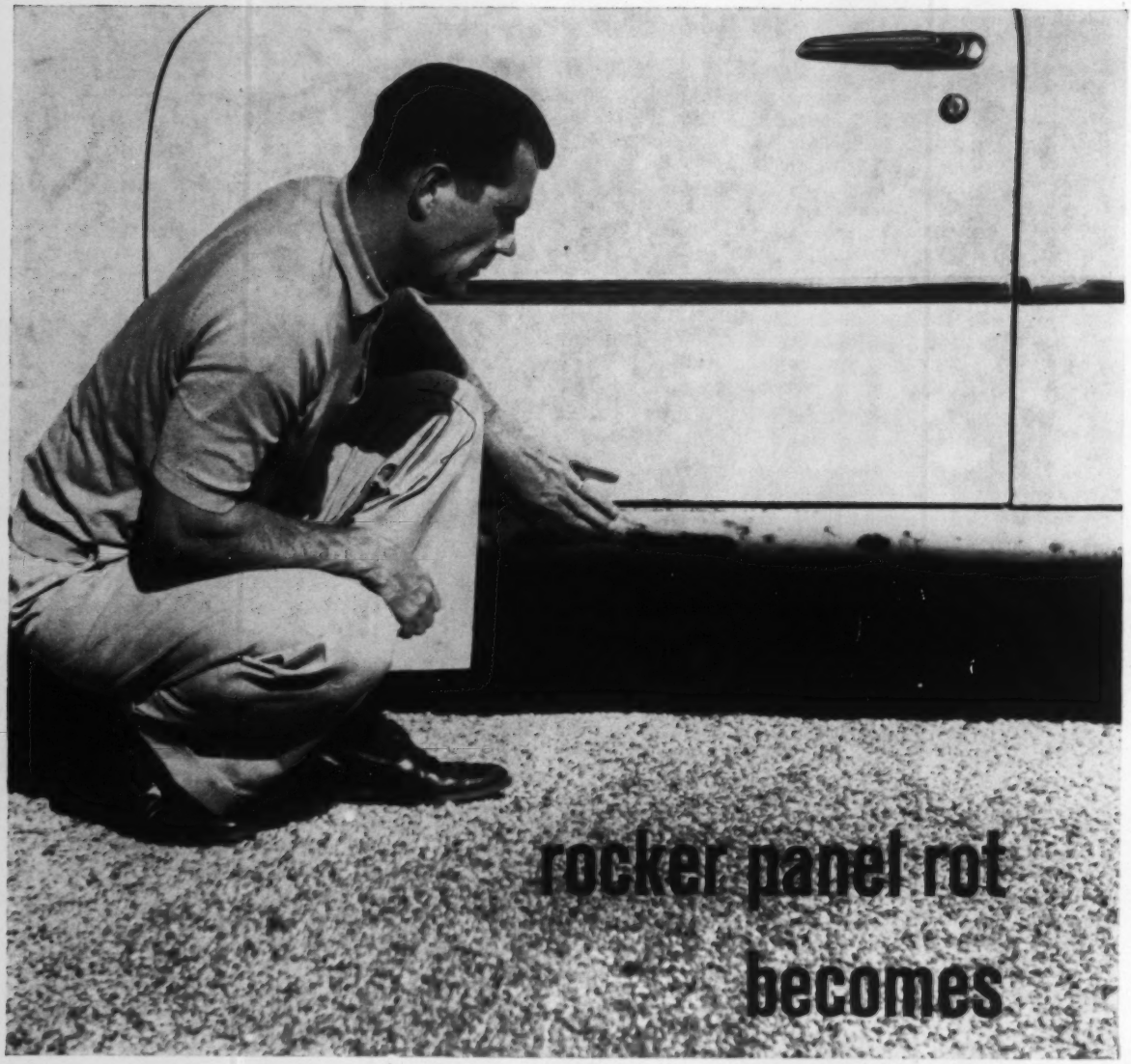
There are numerous applications for specialty steels made by Jessop Steel Company in DEW Line installations. For example, forging quality alloys and wear-resistant tool steels for the gear mechanism of a rotating surveillance radar; cast-to-shape steel for certain other component parts and precision ground steels for delicate instrumentation.

Jessop is keenly aware of the importance of built-in dependability in the steelmaking process—whether meeting specifications for steel to be used in the nuclear reactor of a Polaris-firing submarine; a Redstone missile to launch an astronaut; an earth-girdling satellite; or a DEW Line radar installation.

Yes, for dependability, you can rely on Jessop . . . the *big* name in specialty steel.

Plants and Service Centers:
Washington, Pa. • Los Angeles • Chicago • Detroit • Owensboro, Ky. • Wallaceburg, Ont.

JESSOP



a thing of the past

Rocker panels have been rusting from the inside out years ahead of other parts of the body. One obvious answer was to form them from corrosion resisting hot dip galvanized. Except that paint peels off galvanized in no time unless it's properly treated. The crying need was for a single phosphating solution to treat steel and hot dip galvanized effectively and at the same time.

Parker's got it!

Bonderite 37, now in use in many automobile body lines and appliance plants, makes paint stick to galvanized like a brother, and creates a corrosion resisting paint bond on steel that matches the high performance of Bonderites that are formulated for steel alone.

If you want to use painted hot dip galvanized for a component that is corrosion-prone, Bonderite 37 is probably your answer, too. Get full information. Write Parker today.

Parker Rust Proof Company, 2158 E. Milwaukee, Detroit 11, Michigan.

PARKER

FIRST IN SURFACE TREATMENTS FOR METALS SINCE 1914

Bonderite

*Reg. U.S. Pat. Off.

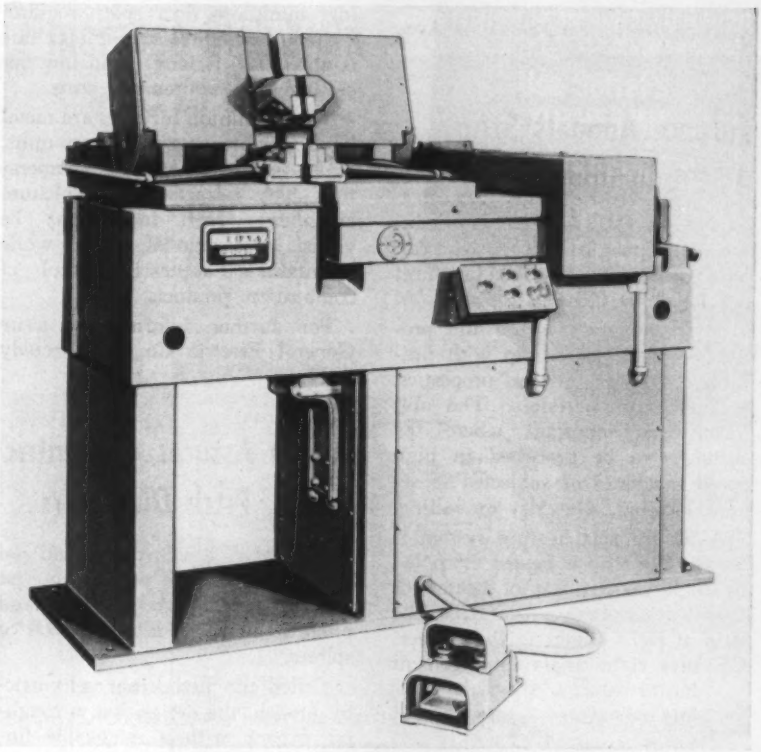
Units Make Production Welds on Many Metals

A WIDE range of metals can be welded on the BPR.O flash butt models available from Sciaky. The company says the units produce high quality welds on small or large production runs of such metals as low carbon steel, stainless steel, aluminum alloys, and copper.

Frame sizes range from one through four. Models are available for 20, 50, 100, and 150 kva at 50 per cent duty cycle. The series is set up to handle a maximum stock width of 6 in., a maximum stock diameter of 3 in., and a minimum diameter ring of 5 ir.. Upset force up to 20,000 lb and clamp force up to 30,000 lb are provided at 80 psi line pressure.

Features include a roller bearing mounted, movable platen; direct acting clamps (force directly adjustable with an air regulator), and vertical adjustment of the righthand platen to compensate for die wear or dies not machined in pairs.

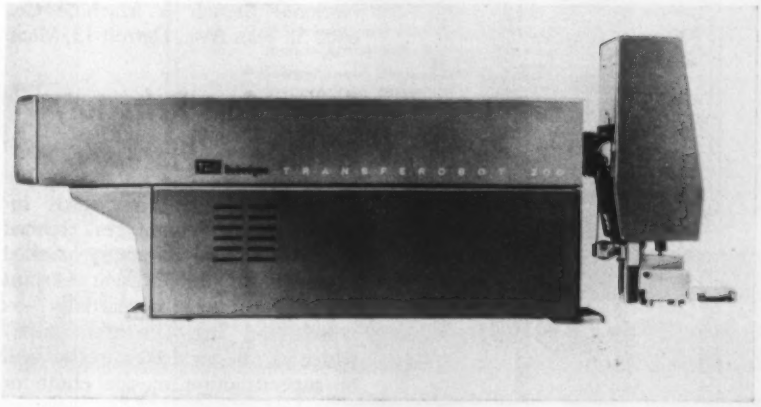
For further information, *write* Dept. BPR.O, Sciaky Bros. Inc., 4915 W. 67th St., Chicago, Ill.



Transfer Unit Helps in Small Part Assembly

THIS versatile device transfers and places parts weighing up to 1 lb in dies, jaws, or nests within tolerances of ±0.002 in. One of the major applications of the unit, TransfeRobot 200, is in the field of small part assembly and handling.

At minimum stroke conditions, the unit does one complete cycle per second. The TR 200 can initiate start and stop signals for the operation of other machinery and it responds to start and stop signals from outside sources. The maker says 1 hour suffices for reprograming and fitting a new set of jaws



(to start another job).

The horizontal stroke is continuously adjustable from 3 to 10 in.; the vertical stroke from 5/8 to 2 in. Over-all dimensions are 24 x 10 x 6 in. The unit weighs about 36 lb. Power requirements: 60 cycle, 110/115 volts ac.

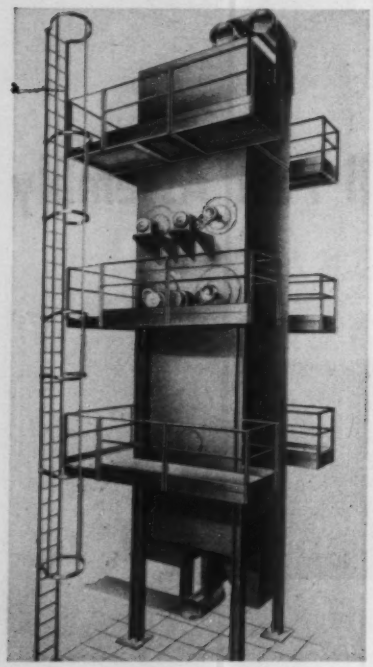
For further information, *write* U. S. Industries Inc., 250 Park Ave., New York 17, N. Y.

Furnace Anneals Strip At Production Rates

CONTINUOUS annealing of aluminum, copper, and brass strip, can be done in a high production unit developed by General Electric.

The company says the unit produces high quality strip with uniform grain size, physical properties, and surface condition. The uniformity is important where the metal is to be processed in high speed machines or subjected to severe forming, drawing, or rolling.

A jet transfer heating system is used. The strip is heated or cooled by high velocity jets of heated or cooled atmosphere which strike the strip at right angles to the surface. GE says right angle impingement



washes away layers of stagnant atmospheres and allows the hot or cool atmosphere to come into intimate contact. Orifices and return passages are arranged so that the atmosphere in each jet can strike the strip and return for reheating or cooling without interfering with the flow pattern of any other jet.

Other advantages: High production rates; no scratching or marking of strip; no stretching or necking; minimum floor space requirements (a complete, continuous line is about 125 ft long); and low operating and maintenance costs.

The aluminum furnaces are metal lined. The copper and brass units, which operate at a higher temperature, have refractory lined plenum chambers. Heat input may be varied by a ratio of 8 to 1 while maintaining accurate control of combustion products.

For further information, *write* General Electric Co., Schenectady 5, N. Y.

Broach Assures Concentric Inside, Pitch Diameters

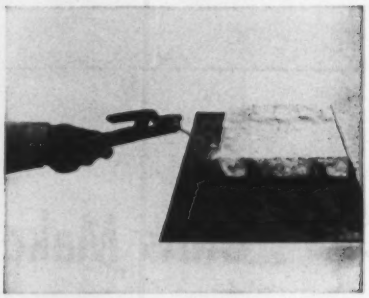
A BROACH designed by National Broach & Machine provides precise concentricity between inside and pitch diameters of internal gears or splines.

Called the Red Ring concentricity broach, the design has a roughing broach with a removable finishing shell. The shell, on the broach end, has alternate round and spline finishing sections. The broaches are made to specifications for parts having spline holds or internal gears up to 12 in. pitch diameter.

For further information, *write* National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.

Fusion Cast Refractory Welds into Place

QUICK, easy, and less costly installation are advantages claimed for a fusion cast refractory. Called Corhart ABR, the abrasion resistant material contains a partially exposed steel lug (in each piece) which can be arcwelded to the shell or superstructure of the chute or



slide. A relief area on the face of each piece helps to facilitate flush mounting. Standard shapes are used, and welding gives each piece a positive, lasting grip on the superstructure.

The company says the material is highly resistant to abrasive attack in such areas as choke chutes, ore chutes, gas washers, clinker chutes, belt scrapers, and pipe liners. The material can be used in most areas where abrasive attack occurs as a result of moving bulk materials, including coke, sinter, cement, clinker, ore, taconite, and hard pelletized items. By placing the refractory in maximum wear areas the entire system can be balanced for longer continuous runs, says the company.

The material is made in a process that involves melting zirconia-alumina-silica to a liquid state in an electric arc furnace at temperatures exceeding 3200° F.

For further information, *write* Corhart Refractories Co., a subsidiary of Corning Glass Works, Louisville 2, Ky.

Checkweighing Machine Handles 10 to 50 lb Loads

THE MACHINE designated 1248 Selectrol is designed for the checkweighing of moving products in conveyor type production lines. Over-all length and width are 25 in. The height is adjustable. The unit can handle 10 to 50 lb packages and 10 to 25 lb bags.

Weighing speed is up to 40 items per minute. Maximum package size is 16 in. square on the base. The manufacturer says weighing accuracy is up to 1/10 of 1 per cent of package weight. Indicator lights show commodity weight and a bell sounds for out of tolerance products. Visual indication of product weight

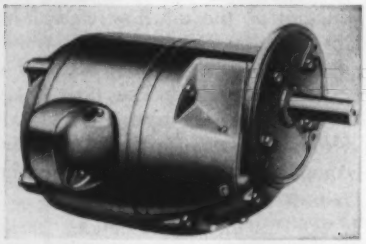
is provided by an over-under scale, plus signal lights for each classification. The basic machine includes circuitry for operating reject mechanisms. Left or righthand feeds are available.

For further information, *write* Exact Weight Scale Co., 541 East Town St., Columbus 15, Ohio.

Gearmotor Designed for Direct Machine Connection

A FOOTLESS gearmotor of the single reduction type has been added to the Syncrogear line.

The motor, designated the Type GH, Unimount Syncrogear, is available with NEMA style C or D brackets in 9 and 10⅞ in. face plate diameters. The company says the unit retains the features of the foot mounted type.



The GH Unimount is available from 1 to 5 HP, 230 to 780 rpm in drip-proof, totally enclosed, and explosion-proof designs.

For further information, *write* U. S. Electrical Motors Inc., Box 2058 Terminal Annex, Los Angeles 54, Calif.

Conveyors Feed, Discharge Wide Variety of Products

A LINE of portable and semiportable conveyors with adjustable heights has been developed by May-Fran. They can be used as auxiliary or independent units to feed or discharge a wide variety of products.

The Series "A" Little Hustler conveyor is portable and features pitch adjustment of the charge and discharge ends to any angle from horizontal to 45 degrees. The Series "S" Little Hustler is semiportable conveyor designed with telescopic legs for raising or lowering the dis-

ROLLING MILL SUPT. reports:

Soffel's

EXOTHERMIC SIDEBOARDS

Increase Slab Yield 5 to 8%

...even more in our "out the door" products

"By increasing yield in the ingot with Soffel's Exothermic Sideboards, we increase our slab yield even more. By the time our finished products go out the door we have added substantially to our volume. Sure, we like Sideboards. They make plenty of dollars and sense to us."

PRODUCT ADVANTAGES

- Eliminate permanent and conventional hot tops.
- Easy, and single, stripping of Big End Down molds.
- Sideboards are easily placed in head of mold by one man — crane only necessary on very large ingots.
- Longer mold life — less mold cost — less mold inventory to carry.

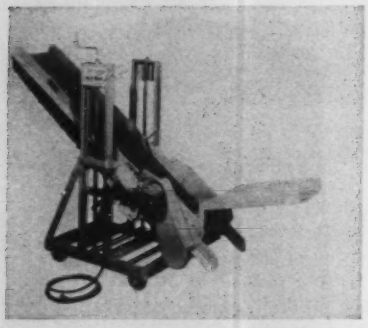
Soffel's Exothermic Sideboards increase ingot yield, assure top cut soundness and provide more ton steel out the door per ton of steel in the ingot.

Phone NAtional 5-1571

Pittsburgh Metals Purifying Co.

A Division of Treesdale Laboratories, Inc.

MARS, PENNSYLVANIA



charge end. Both series are available with neoprene impregnated fabric belts for general purpose use or hinged steel belting that handles hot abrasives. Both series come with 4, 6, 8, 10, and 12 ft conveyors. Belt widths of 12, 18, or 24 in. can be supplied.

For further information, *write* May-Fran Mfg. Co., a div. of Fischer & Associates Inc., 1710 Clarkstone Rd., Cleveland 12, Ohio.

Hydraulic Die Cylinder Has Self-Aligning Piston

A BALL joint contact is used between the piston and the piston rod in the Hyson SA series of cylinders. A floating guide ring replaces the conventional piston rod bearing. The ring holds the piston rod in place during installation. Once installed and in contact in the die, the ring serves only as a wiper to prevent dirt from entering the cylinder. The company says its design provides long service life without leakage, scoring, or other difficulties.

For further information, *write* Precision Products Inc., 8811 Maywood Ave., Cleveland 2, Ohio.

Electronic Device Signals Transfer Press Trouble

THE EXACT location of a malfunction in slide transfer mechanisms is signaled by an electronic device which also shuts down the unit before damage can occur.

The unit provides protection for any number of stations. Die damage, downtime, press slowdowns, and other difficulties can be eliminated by the control.

The unit automatically compensates for temperature changes, voltage fluctuations, and normal mechanical changes as the press warms up. Built-in auxiliary units also protect operating machinery from buckling, end-of-material, and misfeed. An optional control is available to indicate improper positioning of work in the die.

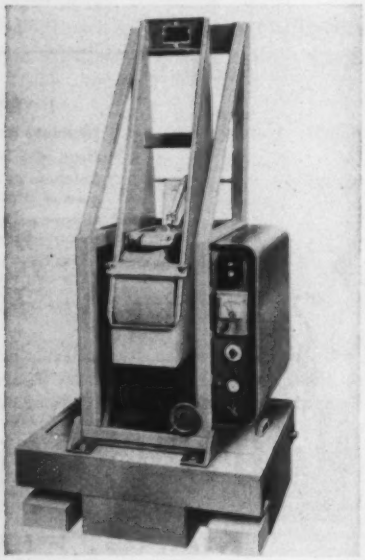
For further information, *write* Wintriss Controls Div., Industrionics Controls Inc., 20-24 Vandam St., New York 13, N. Y.

Wash Setup Recirculating On Orbital Finisher

CLEAN WORK, fast cutting action, and long life for tumbling media are some of the features of the Rampe Vi-Brader precision finishing machine. Using a recirculating wash system, the machine provides continuous washing action on media and parts during deburring, radius forming, or polishing. Wastes are removed; compounds remain uncontaminated; and process parts do not require a separate cleaning cycle.

The recirculation system maintains a regulated flow of water to the processing tub, removing the waste water through a screened drain opening at the bottom.

The unit rotates the load in a circular controlled orbit. It is equipped with variable speed control, conventional tumbling barrels or tubs, and a 1¼ cu ft capacity. Accessory controls and equipment are available.



For further information, *write* Rampe Mfg. Co., 14915 Woodworth Ave., Cleveland 10, Ohio.

Gaging Setup Checks Parts After Centerless Grinding

A GAGE setup designed by RCA checks parts leaving centerless grinders. The equipment consists of a limit signaling comparator and a fixture with twin air jets on a V-block. The block is mounted on the end of the centerless grinder rest blade.

Parts leaving the grinder enter the fixture and pass through the opposing air jets. The increase or reduction of the air flow caused by the part diameter variation is translated into a signal that actuates a meter and light. The time delay switch prevents spurious signals (from gaps between the parts). The comparator can be located on the grinder or nearby support.

For further information, *write* Industrial & Automation Div., Radio Corp. of America, 12605 Arnold Ave., Detroit 39, Mich.

Lift Head Feature Speeds Vertical Handling

SUBSTANTIAL improvements in lift truck raising and lowering functions are claimed with the Hyster two speed hoist system. It cuts up and down traveling time by automatically sensing weight load and adjusting speed accordingly. When handling maximum rated loads, the hoist works at normal, fast, lifting speeds. With empty or partial loads (up to half of top capacity) the lifting speed is automatically doubled. The company claims a 20 per cent production increase in some factory operations.

The system is being used on Hyster's Challenger C Series and the Space Saver B Series.

For further information, *write* Industrial Truck Div., Hyster Co., Box 847, Danville, Ill.

NEW Literature

Write directly to the company for a copy

Servocontrolled Pumps

A 20 page bulletin discusses the application of variable displacement pumps with electrohydraulic servocontrols. Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.

Electrolytic Machining

A booklet discusses automatic current controls for electrolytic machining. Anocut Engineering Co., 631 West Washington Blvd., Chicago 6, Ill.

Industrial Skin Packaging

Brief case histories show the economy, adaptability, and protection afforded by skin packaging. Inventory control, product identification, and other advantages are detailed. Union Carbide Development Co., 270 Park Ave., New York 17, New York.

Sieves for Size Analysis

Information on the selection of testing sieves for size analysis of crushed, pulverized, or screened products is presented in the 1962 edition of the 48 page handbook, *Testing Sieves and Their Uses.* The publication carries specifications on the new U. S. Sieve Series ASTM E-11-61 (published as a final standard on September, 1961), a comparison of U. S. Tyler, and principal foreign Standard Sieve Series, and a list of foreign standards using the fourth root of two systems of sieve openings. Ask for Handbook 53. W. S. Tyler Co., 3615 Superior Ave., Cleveland 14, Ohio.

Solid Lubricants

"Breaking Lubrication Barriers" describes how solid lubricants can be utilized. Specify Bulletin 132. Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn.

Coolant Filtration

Case histories demonstrate how clean coolant makes it possible to lengthen tool and wheel life and cut down time for wheel dressing, tool sharpening, and sump tank cleaning. Filtration Div., Hoffman Industries Inc., Thompson Rd., Syracuse 6, N. Y.

Investment in Machinery

Case histories in a 14 page brochure on manufacturing research and engineering provide tips on setting up complete new manufacturing facilities, revising antiquated production facilities, deciding what operations to automate for the greatest return, and analyzing the investment for an assembly machine. Manufacturing Systems Div., Designers for Industry Inc., 4241 Fulton Parkway, Cleveland 9, Ohio.

Screw Machine Stock

Alcoa Aluminum Screw Machine Stock, a handbook, is intended to aid designers in specifying material and operators in attaining correct machining practices. The book (154 pages, spiral bound) has four tabbed sections that contain general information, properties and tolerances, estimating information, and tooling and operating data. Aluminum Co. of America, 728 Alcoa Bldg., Pittsburgh 19, Pa.

Noble Metal Composite

Vol. II, No. 2 of the Engelhard Industries Technical Bulletin describes a noble metal composite. Called Trilay, it's designed to provide long life and improved strength under high temperature and corrosive conditions. It's composed of a layer of powdered platinum bonded between two outside layers of wrought platinum or platinum alloy. The bulletin also contains three articles on precious metals catalysts and one on diamond superstructure. Engelhard Industries Inc., 113 Astor St., Newark 2, N. J.

Hot Galvanizing

Hot Galvanizing—The Process and the Product is the second of a series of technical booklets. It describes the hot galvanizing process and contains notes on the formation of alloy layers, spangle, corrosion resistance, fabricating, and methods of finishing. Hot Dip Galvanizers Association, 34 Berkeley Square, London W 1, England.

Instrumentation Symbols

Symbols used by instrument and process engineers in drawing process flow sheets and schematic control systems are listed in Bulletin 91-53G-02, *Suggested Flowsheet Instrumentation Symbols* (four pages). Fischer & Porter Co., 946 Jacksonville Rd., Warminster, Pa.

V-Band Couplings

The applications of V-band couplings are discussed in a booklet, No. SDP-2. Marman Div., Aeroquip Corp, 11214 Exposition Blvd., Los Angeles 64, Calif.

Pressure Sensitive Tape

How to Select a Pressure Sensitive Tape includes information on tape failures and a glossary of terminology applied to tapes. Dutch Brand Div., Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y.

Induction Heating

High Frequency Heating Review includes case histories on induction heating in the manufacture of special vacuum tubes, induction coupled plasma torch, and induction melting for investment casting. Lepel High Frequency Laboratories Inc., Woodside, N. Y.

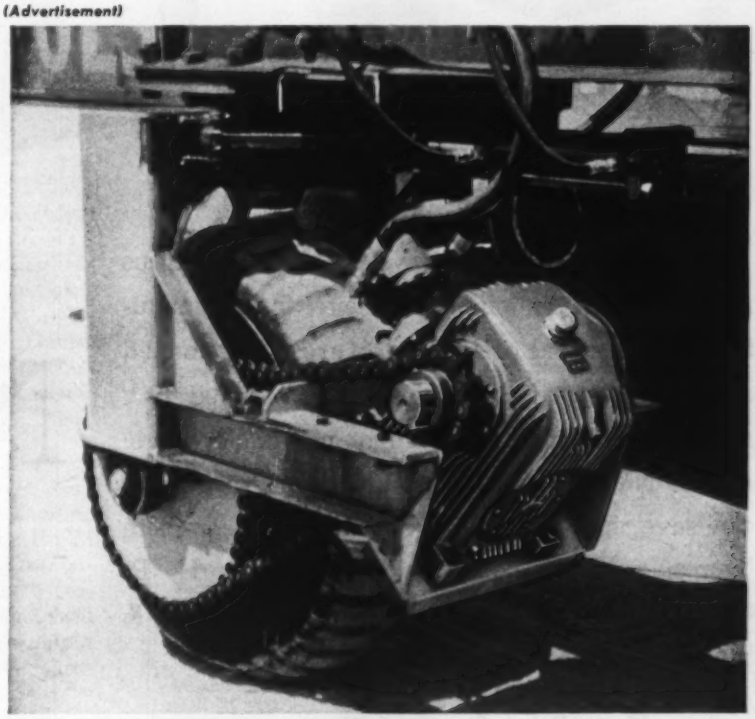
Adjustable Speed Drives

Analysis, comparison, and selection of adjustable speed drives are discussed in Bulletin GEA-6999 (32 pages). General Electric Co., Schenectady 5, N. Y.

Vacuum Metallizing

Advantages of vacuum metallizing are discussed in a brochure (No. 584). Suggestions are given on lacquering and filament arrangement. F. J. Stokes Corp., 5500 Tabor Rd., Philadelphia 20, Pa.

(Advertisement)



STURGEON BAY, Wisc. Manufacturer solves drive problem for traveling crane by mounting hydraulic motor-driven speed reducer at wheel. Double-enveloping worm gear design permits compact unit necessary for application. Available from Cone-Drive Gears, Div. Michigan Tool Co., 7171 E. McNichols Road, Detroit 12, Michigan.

Save $283,700 a year in the manufacture of metal office furniture

In its detailed study of N&W territory, Fantus Area Research pinpointed ideal sites for the manufacture of metal office furniture. Estimated operating costs at these sites were compared with actual operating costs of similar plants elsewhere. At the N&W sites a metal office furniture plant can save up to $283,700 a year. For complete figures, write on company letterhead to H. P. Cotton, Assistant Vice President, Norfolk & Western Railway, Roanoke, Va.

Many Other Types of Plants can cut costs in N&W territory. Write and see if your company is among them.

N&W

NORFOLK and WESTERN RAILWAY

Nation's Going-est Railroad

Slight Downturn for November

LOOK FOR steel production to drop slightly in November, pick up in December, but fall short of last year's total.

November's output will slip 3 to 4 per cent below October's because: 1. Demand is starting to taper off seasonally in such industries as can-making, construction, railroad trackwork, and agriculture. 2. Automakers aren't taking up the slack. They're planning to buy the same amount of steel in November as they did in October. 3. Other users aren't building inventories—except as required to support gradually rising production schedules.

Because November is a shorter month than October and contains a holiday, shipments will also drop moderately.

NO ACCELERATION—For the rest of the year, steelmaking will continue at 70 to 75 per cent of 1960 capacity. Operations in that range will be closely attuned to consumption and should be profitable for most producers. The industry's disappointment stems from the frustration of its hopes for a really big fourth quarter. Those hopes are out the window because the auto strikes, though short, had a serious impact. They curtailed 1962 model output by nearly 250,000 assemblies—the equivalent of almost 500,000 tons of finished steel.

Automakers can make up part of that, but not all, by the end of the year. Detroit is currently building cars at the rate of about 35,000 a day and selling them at a 20,000 daily clip. Dealers have a skimpy 30 days' supply of new models on hand. Inventory at this time last year was 45 days.

UPTURN IN DECEMBER— Although GM's buying plans for December aren't known yet, both Ford and Chrysler Corp. are reportedly planning to step up their purchases by 10 per cent. If GM follows suit and if new strength develops in non-automotive markets that aren't subject to seasonal decline, December ingot production will exceed November's. Look for December's output to be about 9.1 million tons and that of the fourth quarter to be 27 million tons.

LESS THAN LAST YEAR'S—Barring a sensational pickup in auto production or a sudden shift toward inventory building, this year's ingot output will be about 97.5 million tons (vs. 99.3 million tons in 1960). Moderate inventory building by mills and their customers might push this year's output as high as 98.5 million tons, but there's no evidence yet of any stockpiling. The mills may increase their in-plant inventories of semifinished material before yearend and ship finished products to wholly owned subsidiaries, so that they won't have to make customers wait in the first quarter, when inventory building is expected to start in earnest.

FORECASTS FOR 1962—Sales of major household appliances should be 3 to 5 per cent higher in 1962 than they have been this year, says W. C. Wichman, vice president, General Electric Co. Sales of farm equipment will increase by 5 per cent if the weather isn't unfavorable, predicts S. W. White Jr., president, Oliver Corp.

PRODUCTION HOLDS—Look for ingot production in the week ending Nov. 4 to be about the same as the 2,035,000 tons that STEEL estimates the industry poured in the week ended Oct. 28. Output then was 0.5 per cent below the previous week's.

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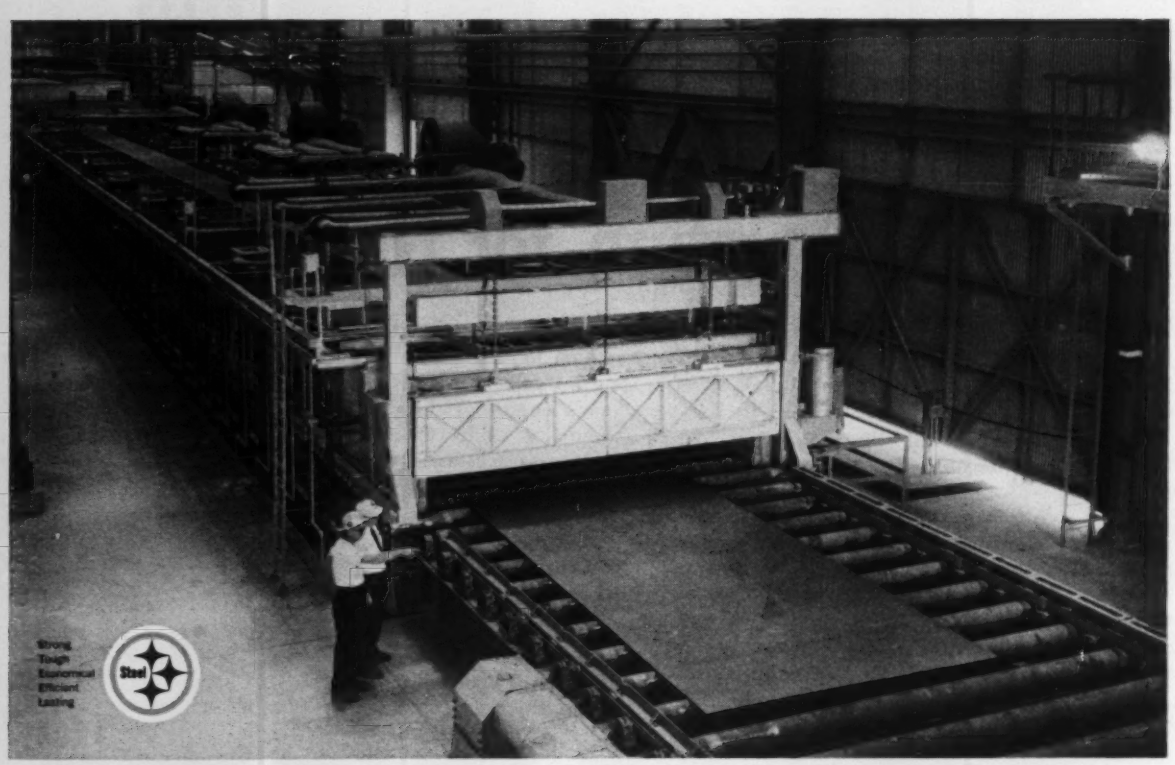
*Current prices were published in the Oct. 16 issue and will appear in subsequent issues.



Completion of this new heat-treating line in Sheffield's Houston plant marks a new era for industry served by Sheffield from the Southwest. The new line shown has the capacity to heat-treat all gauges and sizes of plates rolled on the plant's plate finishing mills. It produces quenched and tempered or normalized plates. It is also designed to handle the wider and heavier plates which will be rolled in the Houston plant's new 160-inch combination slab and plate mill—to be completed in 1962.

Sheffield now makes available a complete line of alloy steels

New heat treating facilities now in operation

This is one of the most modern heat treating lines in the country. With this addition, Sheffield's facilities are now complete for processing all types of alloy steel including new SSS-100. This is the remarkable new Sheffield alloy steel which makes it possible to design with lighter components without sacrificing strength. For more information write **Sheffield Division, Armco Steel Corporation, Attention Alloy Sales, P.O. Box 3129, Houston 1, Texas.**

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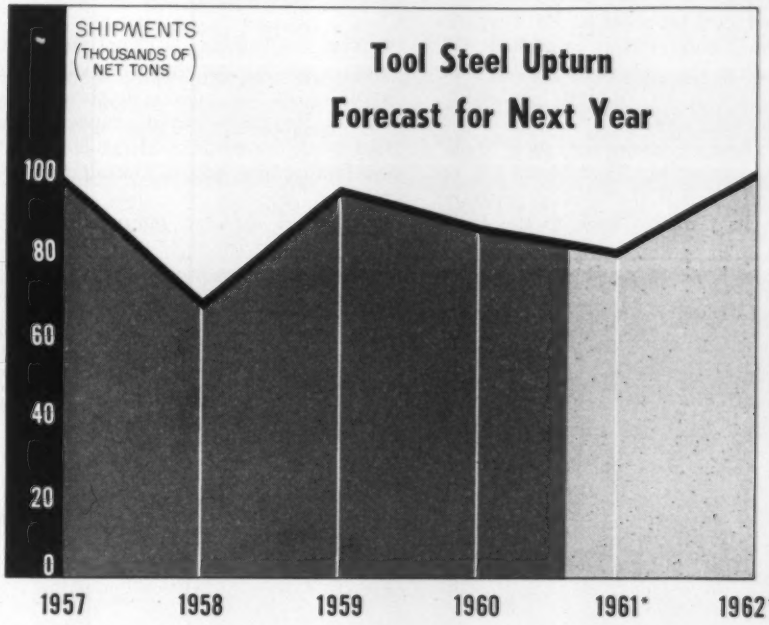
Heat Treated Carbon and Alloy Steels

The ultra-modern group of electronic devices you see above regulates temperature, pressure and timing in Sheffield furnaces automatically. Plates are quenched in water, then re-heated in the tempering furnace. An operator checks the entire process by closed-circuit television which can "see" the inside of the furnaces.

ARMCO Sheffield Division

Business for Tool Steel Builds Up



Source: AISI.

*Estimated by STEEL.

LOOK for an abrupt reversal next year in the downtrend in tool steel shipments that started in 1959.

It's coming in spite of the increasingly sharp competition U. S.-made steels face from carbides, plastics, ceramics, and imports. Reasons:

- Durable goods production is picking up and will lead the national economy to new highs in 1962 (see STEEL, Oct. 2, pp. 21-23).
- Automakers and their suppliers, who normally provide a market for 20 to 25 per cent of tool and die steel shipments, are planning some of the biggest model changes in years. Some of the body tooling for 1963 models has already been released; the bulk of the work will be let shortly.

● **Sales Improving**—Because of the auto industry strikes, tool steel producers haven't yet felt the impact of Detroit's big programs. But they're getting more business from other users whose consumption is climbing. August shipments were 37 per cent above July's. September shipments were larger than August's, and orders for October are running slightly ahead of September's.

There's not much chance that this year's shipments will be as large as last year's—through August, they were 21 per cent behind; but the gap is narrowing. By Dec. 31, they'll probably climb to 80,000 tons (vs. 86,784 tons in 1960). Next year, you can expect a 20 per cent increase. Shipments will be close to 100,000 tons—the highest level since that of 1956.

● **Surplus Capacity** — If demand warranted it, U. S. mills could probably ship 250,000 to 300,000 tons a year. But the market has been relatively static since 1956. Annual consumption seems to have leveled at something less than 100,000 tons. In the last two years, the pressure of idle capacity has given birth to sharp competition and price cutting. The reductions haven't been as frequent or widespread as in stainless steel, but they've been troublesome.

● **Foreign Competition** — In part, the price cuts have reflected efforts of U. S. producers to hold their own in the face of stiff competition from imports. Toughest of the European competitors is Bohler Bros. Ltd. of Austria. That firm has been quoting hot work extrusion die steels at 20 per cent below the U. S. market. Says a U. S. producer: "Some of us met the 20 per cent reduction and got our customers back. Bohler reacted by cutting to 25 per cent, but our customers stayed with us. They preferred to buy American if the difference was only 5 percentage points."

The threat from Canada is equally serious, U. S. mills assert. They point out that a big Canadian producer has been selling in Detroit and other metalworking centers at prices sharply below the U. S. market. Example: A manganese, oil hardening grade is being quoted at a discount of 55 per cent from the published lists of most domestic mills. "That's bad enough," says a U. S. producer, "but they really try my good nature when they claim they're not foreign—they're just our brothers from across the river."

● **Serious Impact**—Imports of tool steel and products made from it cost the U. S. an estimated 2000 jobs last year, says H. S. Potter, vice president-sales, Carpenter Steel Co., Reading, Pa. Testifying in August before the House Subcommittee on the Impact of Imports & Exports on American Employment, he pointed out: Imports of tool and high speed steels in 1958 came to 2900 tons, about 4 per cent of domestic tool steel production. In 1960, they were close to 12,000 tons—about 12 per cent of U. S. production. "The reason is simply price," he declared, "and U. S. producers cannot meet those prices without operating at a loss."

What's the solution? "It probably isn't tariffs," says a U. S. pro-

ducer. "To be effective, they would have to be so high that they would sound ridiculous. We favor: 1. Putting quotas on imports if they reach a level that threatens to destroy U. S. mills. 2. Giving U. S. producers tax relief so that they can install cost cutting equipment. 3. Making the most of our selling tools —superior service, fast availability, and high quality."

There's evidence that such "tools" are productive. Ford Motor Co. recently pulled the tooling programs for its Cardinal back to the U. S. The work will be completed here because: 1. The British tool and die industry has been plagued by labor difficulties. 2. European shops weren't able to meet Ford's quality standards.

• **New Applications** — Tool steelmakers are hoping that nontooling applications will provide important outlets for their surplus capacity. Hot work die steels, such as H-11, are finding new uses in aircraft and missiles because of their high strength at elevated temperatures. As temperature requirements increase, missilemakers may have to switch to metals with higher heat resistance—but there's hope there too. Reason: Super-high-speed tool steels are being used increasingly to machine such metals as Inconel, molybdenum, and columbium.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 95 & 96

October shipments of sheets and strip equaled or slightly exceeded September's. The outlook for November depends principally on the auto industry's purchasing plans. Automakers say their November buy will be the same as October's, but there's always the chance of an upward adjustment.

Barring a strong acceleration in automotive demand, November shipments probably won't equal October's. Only a sharp upturn in orders would cause the mills to ship overtime in a month that has two less shipping days than October.

Early guesses about December are conflicting. Some mills expect shipments to increase because of higher automotive demand. Others say they'll drop because many users will be trying to hold their inventories down to minimize their liability for yearend property taxes.

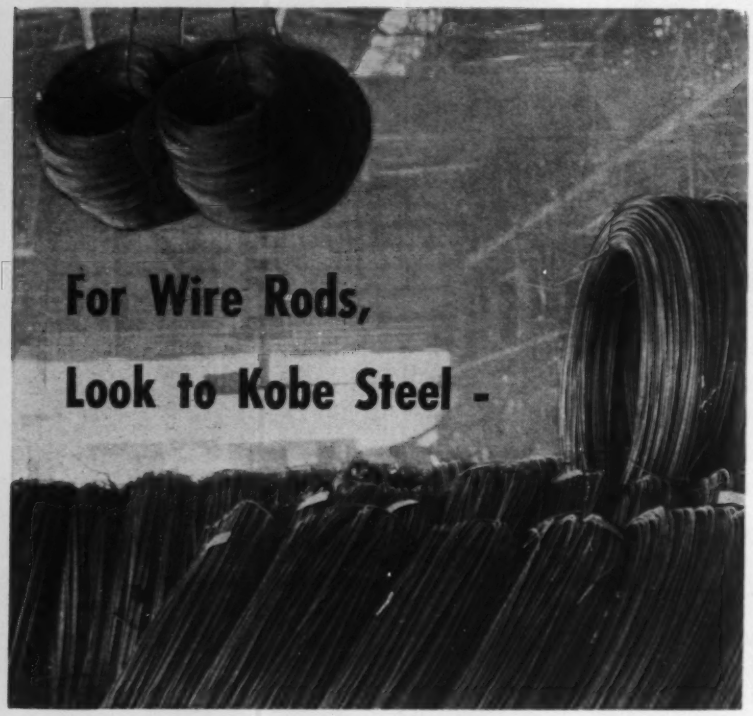
Demand for oriented silicon steels has been good for the last six months and probably won't weaken before June. Leading producers are operating their lines 20 turns a week to meet the requirements of transformer manufacturers. October shipments were slightly higher than September's. Deliveries are being quoted at six to eight weeks.

Effective Oct. 18, Atlantic Steel Co., Atlanta, eliminated the 25 cent per 100 lb extra for nonacceptance of 10 per cent shorts on hot rolled carbon strip.

Freight Car Buying Gain Substantial in September

Though domestic freight car buying continues light, a pickup was noted in September. The American Railway Car Institute and the Association of American Railroads report bookings that month amounted to 3143 cars vs. 1474 in August, and 2156 in September a year ago.

Deliveries in September totaled 2700 cars vs. 2428 in August, and



With 35 years of experience in the production of low carbon steel wire rods, and a proud record of being the first to produce high carbon steel wire rods in Japan over 30 years ago.

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4300 in September, 1960. Of the cars delivered in September, 2014 were built by commercial shops and 686 by railroad shops.

Car backlogs as of Oct. 1 showed 6292 units on order in railroad shops and 3841 in commercial plants, a total of 10,133. That compares with 9690 units on order and undelivered on Sept. 1, and 21,662 on Oct. 1, 1960.

Included in cars on order and undelivered Oct. 1 were 3201 plain boxcars, 2236 hoppercars, 1403 refrigerator cars, and 1363 flatcars. Other types included 891 tankcars, 621 covered hoppercars, and 250 gondolas.

Steel Bars . . .

Bar Prices, Page 94

Bar orders for the accelerated production of the M-14 rifle include the first contract to a non-New England shop. Thompson-Ramo-Wooldridge Inc., Cleveland, booked 100,000 rifles with a bonus—provided first deliveries are made in less than 13 months. The Cleveland firm has two contracts, one for 100,000 rifles, costing $8,554,076, and a second involving $6,522,164 for new and rehabilitated equipment.

Production at the New England plants, Worcester, Mass., New Haven, Conn., and the Springfield (Mass.) Armory is increasing rapidly.

The Army has on order 572,500 M-14s and will contract for an additional 363,500 before June 30. Production is about 45,000 monthly.

While the barmakers still report they are booking a fair volume of new orders, demand for quality material is particularly in evidence. Mill rolling cycles are being held close to 30 days.

A resurgence of the oil tool industry from its slump of the last year is lending impetus to demand for cold drawn bars. Volume is up only slightly, but it is improved compared with demand a year ago at this time.

Texas Steel Imports Outrunning 1960 Pace

Despite a September decline in steel imports, shipments into Texas are running far ahead of last year's. Third quarter imports totaled 129,000 tons vs. 78,000 in the same period of 1960.

Domestic producers in the area report that fourth quarter demand has leveled off, and they say foreign steel is preventing local mill operations from climbing. Importers are alert to market conditions. As demand for plates mounted and mill order books became filled, one Houston importer announced he was bringing in a 2500 ton plate shipment from South Africa.

A Texas mill spokesman says a strong buy American attitude in some areas has slowed sales of imported steel. For example, foreign steel offerings are meeting resistance in the Dallas area but the influence is almost nonexistent in San Antonio, he said.

Pig Iron . . .

Pig Iron Prices, Page 101

With foundries continuing to buy hand to mouth, there's little change in the merchant pig iron market. Buyers are showing little interest in piling inventories for the winter since there's plenty available at fur-

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The *only* accurate way to measure your abrasive costs is to determine *cost per ton of castings cleaned—not* just the cost of abrasive.

Rotoblast Steel Shot and Grit clean castings at lower cost per ton than other abrasives. That is why Rotoblast Steel Abrasives are the fastest growing on the market today. *Sales volume has tripled in 3 years!*

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naces, and no difficulty is anticipated in getting prompt shipments.

Merchant iron producers have idle furnace capacity which can be put into operation if the need arises. The steel mills can also make more merchant iron available.

U. S. Pipe & Foundry Co., Birmingham, plans some maintenance work on its two blast furnaces, anticipitating a pickup in demand that will require relightening the stacks in early 1962.

Wire . . .

Wire Prices, Page 96 & 99

Wire mill bookings during October have been the heaviest in two months. Orders are not heavy enough to tax capacity, but some producers (including specialties makers) are operating around 80 per cent of capacity.

Most buying of drawn wire products is for prompt shipment. There is little price-hedge buying, but consumption is heavier.

Ingot Production Slumping

WITH DEMAND from the automotive industry not up to expectations, the slowdown in steel production continues, but it looks like the ingot rate is reaching a plateau. Production for the latest week of record (ended Oct. 21) totaled 2,042,000 net tons, a decrease of 1.4 per cent from the 2,071,000 tons poured in the preceding week.

STEEL estimates output in the week ended Oct. 28 will fall about ½ per cent to around 2,035,000 net tons. The estimate is based on reports from the separate producing districts, which, in the main, show operations are holding fairly steady.

• **Pittsburgh** — Indications are district output is holding in the neighborhood of 425,000 tons. The latest report of the American Iron & Steel Institute showed the steelmaking index for the district at 105, and it's expected to hold at that point the next week or so.

• **Chicago**—Steelmaking operations here are scheduled at 72 per cent of 1960 capacity for the week ended Oct. 28, unchanged from the previous week. A few mills are making fractional increases in their melting rates, but several others are making small cuts.

• **Youngstown**—The district ingot rate last week declined 3 points to 61 per cent of 1960 capacity, with 36 open hearths and 11 blast furnaces in operation. Steel shipments have been affected adversely by the auto labor trouble.

• **Philadelphia** — Ingot production in the Northeastern District reflects little change from a week ago, when the AISI index was off 1 point to 111.

• **St. Louis**—Little change in steel production here is reported. Output in the latest week of record was up a little more than 1000 tons from the preceding week, totaling around 39,992 tons. In the like week a year ago, output averaged 38,493 tons.

• **Birmingham** — The steelmaking rate here is estimated at 75 per cent of 1960 capacity. One producer has been building semifinished inventory and may curtail operations slightly in a couple of weeks.

• **Cleveland**—Ingot operations continue to slide. District output in the latest week of record is reported at 106,490 net tons. That's down noticeably from the 117,602 tons reported the preceding week.

• **Cincinnati** — Production here moved to what may be the district's high ingot rate for the year. Output in the Oct. 21 week reached 96,512 tons, a rate equal to 85 per cent of capacity. The forecast for the Oct. 28 week shows the mills expect to produce 93,865 tons.

• **Buffalo** — Steel production here has declined to 56.2 per cent of capacity due to reduced operations at two mills. Bethlehem shut down an open hearth, now operating 18 of its 35 furnaces. Wickwire Spencer also took off an open hearth.

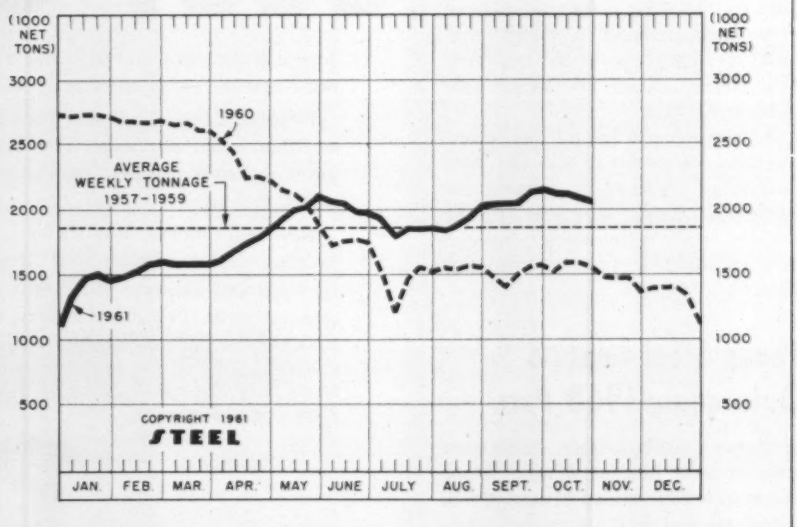
• **Los Angeles**—The production pattern among leading mills is uneven. The Western ingot operating rate is estimated around 78.8 per cent of capacity, a slight dip.

STEEL INGOT PRODUCTION

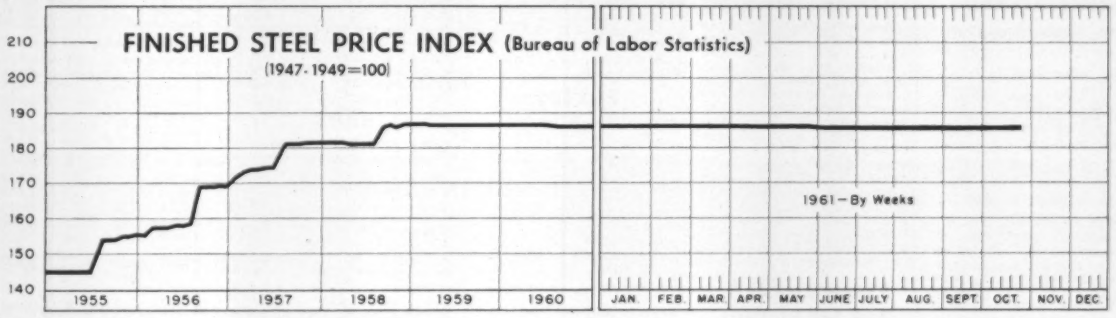
Weeks Ended	Net Tons	Change
Oct. 28	2,035,000*	— 0.5%
Oct. 21	2,042,000	— 1.4%
Oct. 14	2,071,000	— 1.5%
Totals to Oct. 21		
1961	76,664,000	— 9.2%
1960	84,481,000	

DISTRICTS	Week Ended —Oct. 21— Tons‡	Index†	Week Ended Oct. 14 Index†
Northeastern	296,592	111	112
Buffalo	100,219	103	104
Pittsburgh	423,780	105	107
Youngstown	170,000	100	102
Cleveland	106,490	115	127
Detroit	117,488	112	110
Chicago	404,028	108	111
Cincinnati	96,512	128	127
St. Louis	67,328	128	119
Southern	120,324	111	109
Western	136,773	117	119
Industry	2,042,000	109.6	111.2

*Estimated by STEEL.
†1957-59 (1,862,933 tons) = 100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Oct. 24, 1961	Week Ago	Month Ago	Sept. Index	Year Ago
185.4	185.4	185.4	185.4	186.2

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Oct. 24

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	(N.A.)
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.775
Sheets, C.R., Stainless, 302 (lb)	0.643
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.225
Strip, C.R., Stainless, 430 (lb)	0.460
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.495
Pipe, Galv., Buttweld (100 ft)	23.098
Pipe Line (100 ft)	195.423
Casing, Oil Well, Carbon (100 ft)	193.028
Casing, Oil Well, Alloy (100 ft)	302.645
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	192.285
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (Bundles)	7.647
Nails, 8d Common (50 lb)	4.715
Wire, Barbed (80-rod spool)	8.372
Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	Oct. 25 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg = 100)	247.82	247.82	247.82	247.82	225.58
Index in cents per lb	6.713	6.713	6.713	6.713	6.111

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$137.48
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	62.63
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	62.18
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	63.41
Steelmaking Scrap, GT	38.33	38.83	39.83	30.17	57.00

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Oct. 25 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	5.075
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	5.075
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.93
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.85
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	5.00
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	5.00
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.745	5.00
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.85
Plates, Chicago	5.30	5.30	5.30	5.30	4.85
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	5.25
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.85
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	5.35
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.75-5.85
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	6.30
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.95
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	7.20
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	8.20
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.85
SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$91.50
Wire rods, $\frac{7}{32}$-$\frac{1}{2}$" Pitts.	6.40	6.40	6.40	6.40	5.80

PIG IRON, Gross Ton	Oct. 25 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$63.50
Basic, Valley	66.00	66.00	66.00	66.00	62.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.18	66.26
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	66.76
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	59.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	66.70
Malleable, Valley	66.50	66.50	66.50	66.50	63.00
Malleable, Chicago	66.50	66.50	66.50	66.50	63.00
Ferromanganese, net ton†	245.00	245.00	245.00	245.00	235.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$37.50	$37.50	$37.50	$28.50	$55.50
No. 1 Heavy Melt, E. Pa.	40.00	40.50	40.50	34.00	57.50
No. 1 Heavy Melt, Chicago	37.50	38.50	41.50	28.00	58.00
No. 1 Heavy Melt, Valley	37.50	39.50	42.50	27.50	63.50
No. 1 Heavy Melt, Cleve.	34.50	36.50	38.50	25.50	61.50
No. 1 Heavy Melt, Buffalo	31.50	32.50	32.50	27.50	57.50
Rails, Rerolling, Chicago	58.50	59.50	61.50	46.50	84.00
No. 1 Cast, Chicago	41.50	42.50	44.50	36.50	50.50
COKE, Net Ton					
Beehive, Furn., Connisvl.	$15.00	$15.00	$15.00	$15.00	$14.50
Beehive, Fdry., Connisvl.	18.25	18.25	18.25	18.25	17.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	29.50

Steel Prices

Mill base prices reported to STEEL, Oct. 25, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 95; footnotes, page 99.

SEMIFINISHED

INGOTS, Carbon Forging (NT)

Munhall,Pa. U5 ....$76.00

INGOT, Alloy (NT)

Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S33 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS

Carbon Rolling (NT)

Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 .....80.00
Lackawanna,N.Y. B2..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 .....80.00
S.Chicago,Ill. R2, U5..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)

Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 ..99.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 .....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. C8 .....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14..99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)

Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .121.00
Detroit S41 .....119.00
Economy,Pa. B14 .....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ..119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2 ..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 .....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14..119.00
S.Duquesne,Pa. U5 ...119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14..122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP

Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ..5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. P5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS

AlabamaCity,Ala. R2 ...6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Barnonville,Ill. K4 ....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 .6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Buffalo S47 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 .....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14 ..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes

AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1..5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14..5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 .....5.50
Struthers,O. Y1 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange

Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N5 .....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14 ..6.80

H.S., L.A., Std. Shapes

Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Phoenixville,Pa. P4 ....8.10
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange

Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ...8.05
Lackawanna,N.Y. B2 ...8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES

Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ...5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ...6.50

PLATES

PLATES, Carbon Steel

AlabamaCity,Ala. R2 ...5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ...5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 ....5.40
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1..5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ...5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B2 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 .....5.30

PLATES, Carbon Abras. Resist.

Claymont,Del. P4 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron

Economy,Pa. B14 ....14.10

PLATES, H.S., L.A.

Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1 .7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy

Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

PLATES, Ingot Iron

Ashland c.l. (15) A10 ..5.55
Ashland l.c.l. (15) A10 ..6.05
Cleveland c.l. R22 ....6.05
Warren,O. R2 .....6.05

FLOOR PLATES

Cleveland J5 .....6.375
Claymont,Del. P4 .....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ..6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 ....6.375

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ..5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 .....5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ..6.125
Niles,Calif. P1 .....6.375
Buffalo S47 .....5.675
Owensboro,Ky.(9) G8..6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 .....6.425
Riverdale,Ill.(9) A1 ....5.675
Seattle(9) A24,B3,N15..6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 .....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11..6.375
Warren,O. C17 .....6.025
Youngstown(9) R2, U5..5.675

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 .....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Buffalo S47 .....6.725
Owensboro,Ky. G8 .....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14 6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ...8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 .....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ...5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
San Francisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron

Economy, Pa. B14 ....16.45

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Loaded (including loaded extra)

Carbon

LosAngeles P2, S30 ..11.75*

Alloy

Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 ....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 .....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 .....8.10
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, H5, P17 ...7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ..7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 .....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 .....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 .....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Alloy (Turned and Ground)

Cumberland,Md.(5) C19 6.55

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 .....9.025
Detroit B5, P17 .....9.225
Detroit H5, S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025

Hammond,Ind. J5, L2 ..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
N.Tonawanda S47 .....9.025
Plymouth,Mich. P5 ....9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 .....9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 .....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

Atlanta A11 .....5.00
Birmingham C15 .....5.25
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fontana,Calif. K1 .....6.375
Ind.Harbor,Ind. Y1 ....5.675
Johnstown,Pa. B2 .....5.675
Joliet,Ill. P22 .....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.475
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. W14 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ..6.10
Williamsport,Pa. S19 ..5.75

BARS, Reinforcing, Billet (Fabricated, to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Johnstown,Pa. B2 .....7.33
Lackawanna,N.Y. B2 ...7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
Seattle A24, B3, N14 ...7.95
Williamsport,Pa. S19 ..7.00

SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 16.10
Economy,Pa.(D.R.)B14 20.50
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 20.50
McK.Rks.(S.R.) L5 ...16.10
McK.Rks(D.R.) L5 ...20.50
McK.Rks.(Dir.Rolled)L5 13.55

BARS, Rail Steel

ChicagoHts.(3) C2, I-2 5.575
ChicagoHts.(4) (44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ...5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 .....5.575
Tonawanda(3) B12 .....5.575
Tonawanda(4) B12 .....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 .....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1 5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 .....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 .....8.40
Irvin,Pa. U5 .....8.40

Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14..7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ....7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 .....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 .....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ...9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland,Ky. A10	7.125	7.375
Canton,O. R2	7.125	....
Fairfield,Ala. T2	7.125	7.375
Gary,Ind. U5	7.125	7.375
GraniteCity,Ill. G4	7.225	....
Ind.Harbor I-2	7.125	7.375
Irvin,Pa. U5	7.125	7.375
Kokomo,Ind. C16	7.225	....
MartinsFry. W10	7.125	7.375
Pitts.,Calif. C11	7.875	....
Pittsburgh J5	7.125	....
SparrowsPt. B2	7.225	....
Weirton W6	7.125	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.375

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (t(ype 1) 9.525

SHEETS, Well Casing

Fontana,Calif. K1 .....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 .....7.50

SHEETS, Galvanized Steel Hot-Dipped‖

AlabamaCity,Ala. R2 .6.875‡
Ashland,Ky. A10 .....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 .....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.H'rb'r,Ind. I-2, Y1 6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10 ..6.875*
Middletown,O. A10 ....6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ...6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous. §For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.
C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire Div., Hoover Ball & Bearing
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
J10 Jay Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnest Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N17 National Steel Corp.
N20 Neville Ferro Alloy Co.

O1 Ohio Ferro-Alloys Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P25 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S31 Sawhill Tubular Products
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada
S47 Seaway Steel Div., Roblin-Seaway Industries
T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Products & Chemical
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Div., National Steel Corp.
W8 Western Cold Drawn Steel Div., Standard Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala City, Ala. (27) R2 ... 5.10
Allenport, Pa. P7 ... 5.10
Alton, Ill L1 ... 5.30
Ashland, Ky. (8) A10 ... 5.10
Atlanta A11 ... 5.10
Bessemer, Ala. T2 ... 5.10
Birmingham C15 ... 5.10
Conshohocken, Pa. A3 ... 5.15
Detroit M1 ... 5.10
Ecorse Mich. G5 ... 5.10
Fairfield, Ala. T2 ... 5.10
Farrell, Pa. S3 ... 5.10
Fontana, Calif. K1 ... 5.825
Gary, Ind. U5 ... 5.10
Ind Harbor, Ind. I-2, Y1 .. 5.10
Johnstown, Pa. (25) B2 .. 5.10
Lackawanna, N.Y. (25) B2 .. 5.10
Los Angeles (25) B3 ... 5.85
Los Angeles C1 ... 8.60
Minnequa, Colo. C10 ... 6.20
Riverdale, Ill. A1 ... 5.10
San Francisco S7 ... 6.60
Seattle (25) B3 ... 6.10
Seattle N14 ... 6.60
Sharon, Pa. S3 ... 5.10
S Chicago, Ill. W14 ... 5.10
S. San Francisco (25) B3 .. 5.85
Sparrows Point, Md. B2 .. 5.10
Torrance, Calif. C11 ... 5.85
Warren, O. R2 ... 5.10
Weirton, W. Va. W6 ... 5.10
Youngstown U5, Y1 .. 5.10

STRIP, Hot-Rolled Alloy

Carnegie, Pa. S18 ... 8.40
Farrell, Pa. S3 ... 8.40
Gary, Ind. U5 ... 8.40
Houston S5 ... 8.65
Ind. Harbor, Ind. Y1 ... 8.40
Kansas City, Mo. S5 ... 8.65
Los Angeles B3 ... 9.60
Lowellville, O. S3 ... 8.40
Newport, Ky. A2 ... 8.40
Sharon, Pa. A2, S3 ... 8.40
S. Chicago, Ill. W14 ... 8.40
Youngstown U5, Y1 ... 8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland, Ky. A10 ... 7.575
Bessemer, Ala. T2 ... 7.575
Conshohocken, Pa. A3 .. 7.575
Ecorse, Mich. G5 ... 7.575
Fairfield, Ala. T2 ... 7.575
Farrell, Pa. S3 ... 7.575
Gary, Ind U5 ... 7.575
Ind. Harbor, Ind. I-2, Y1 .. 7.575
Lackawanna, N.Y. B2 .. 7.575
Los Angeles (25) B3 ... 8.325
Seattle (25) B3 ... 8.575
Sharon, Pa. S3 ... 7.575
S Chicago, Ill. W14 ... 7.575
S San Francisco (25) B3 .. 8.325
Sparrows Point, Md. B2 .. 7.575
Warren, O. R2 ... 7.575
Weirton, W. Va. W6 ... 7.575
Youngstown U5, Y1 ... 7.575

STRIP, Hot-Rolled Ingot Iron

Ashland, Ky. (8) A10 ... 5.35
Warren, O. R2 ... 5.875

STRIP, Cold-Rolled Carbon

Anderson, Ind. G6 ... 7.425
Baltimore T6 ... 7.425
Boston T6 ... 7.975
Buffalo S40 ... 7.425
Cleveland A7 ... 7.425
Dearborn, Mich. S3 ... 7.425
Detroit D2, M1, P20 .. 7.425
Dover, O. G6 ... 7.425
Evanston, Ill. M22 ... 7.425
Farrell, Pa. S3 ... 7.425
Follansbee, W. Va. W10 .. 7.425
Fontana, Calif. K1 ... 9.20
Franklin Park, Ill. T6 .. 7.425
Ind. Harbor, Ind. Y1 ... 7.425
Indianapolis S41 ... 7.575
Los Angeles C1, S41 ... 9.30
McKeesport, Pa. E10 ... 7.525
New Bedford, Mass. R10 7.875
New Britain, Conn. S15 .. 7.875
New Castle, Pa. B4, M23 .. 7.425
New Haven, Conn. D2 .. 7.875
New Kensington, Pa. A6 .. 7.425
Pawtucket, R.I. R3, N8 .. 7.975
Philadelphia P24 ... 7.875
Riverdale, Ill. A1 ... 7.425
Rome, N.Y. (32) R6 ... 7.425
Sharon, Pa. S3 ... 7.425
Trenton, N.J. (31) R5 .. 8.875
Warren, O. R2, T5 ... 7.425
Worcester, Mass. A7 ... 7.975
Youngstown S41, Y1 ... 7.425

STRIP, Cold-Rolled Alloy

Boston T6 ... 15.90
Carnegie, Pa. S18 ... 15.55
Cleveland A7 ... 15.55
Dover, O. G6 ... 15.55
Farrell, Pa. S3 ... 15.55
Franklin Park, Ill. T6 .. 15.55
Harrison, N.J. S18 ... 15.55
Indianapolis S41 ... 15.70
Los Angeles S41 ... 17.75
Lowellville, O. S3 ... 15.55
Pawtucket, R.I. S8 ... 15.90
Riverdale, Ill. A1 ... 15.55
Sharon, Pa. S3 ... 15.55
Worcester, Mass. A7 ... 15.85
Youngstown S41 ... 15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 ... 10.80
Dearborn, Mich. S3 ... 10.80
Dover, O. G6 ... 10.80
Farrell, Pa. S3 ... 10.80
Ind. Harbor, Ind. Y1 ... 10.80
Sharon, Pa. S3 ... 10.80
Warren, O. R2 ... 10.80
Weirton, W. Va. W6 ... 10.80
Youngstown Y1 ... 10.80

STRIP, Galvanized (Continuous)

Farrell, Pa. S3 ... 7.50
Sharon, Pa. S3 ... 7.50

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson, Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie, Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn, Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover, O. G6	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. M22	9.05	10.40	12.60	15.60	....
Farrell, Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria, O. S1	10.05	10.40	12.60	15.60	....
Franklin Park, Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison, N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
Los Angeles C1	11.15	12.60	14.80	17.80	....
Los Angeles S41	11.15	12.60	14.80	....	....
New Britain, Conn. S15	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. B4, M23	8.95	10.40	12.60	15.60	....
New Haven, Conn. D2	9.40	10.70	12.90	15.90	....
New Kensington, Pa. A6	8.95	10.40	12.60	15.60	....
New York W3	....	10.70	12.90	16.10	19.30
Pawtucket, R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome, N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon, Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton, N.J. R5	....	10.70	12.90	15.90	18.85
Warren, O. T5	8.95	10.40	12.60	15.60	18.55
Worcester, Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol, Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria, O. S1	19.05	22.15	....
Franklin Park, Ill. T6	19.20	23.30	28.15
Harrison, N.J. C18	18.85	22.95	27.80
New York W3	18.85	22.95	27.80
Palmer, Mass. W12	18.85	....	....
Trenton, N.J. R5	18.85	22.95	27.80
Worcester, Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

TIN MILL PRODUCTS

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Basis Weight 45 lb	50 lb	55 lb	60 lb
Fairfield, Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless, Pa. U5	6.10	6.25	6.40	6.55
Gary, Ind. U5	6.10	6.25	6.40	6.55
Indiana Harbor, Ind. I-2	6.10	6.25	6.40	6.55
Irwin, Pa. U5	6.10	6.25	6.40	6.55
Sparrows Point, Md. B2	6.10	6.25	6.40	6.55
Weirton, W. Va. W6	6.10	6.25	6.40	6.55

TIN PLATE, Electrolytic 0.25 lb (100 lb basis wt) Coating

Aliquippa, Pa. J5 ... $9.10
Fairfield, Ala. T2 ... 9.10
Fairless, Pa. U5 ... 9.10
Fontana, Calif. K1 ... 9.75
Gary, Ind. U5 ... 9.10
Granite City, Ill. G4 ... 9.20
Ind. Harb., Ind. I-2, Y1 .. 9.10
Irvin, Pa. U5 ... 9.10
Niles, O. R2 ... 9.10
Pittsburg, Calif. C11 ... 9.75
Sparrows Pt., Md. B2 ... 9.10
Weirton, W. Va. W6 ... 9.10
Yorkville, O. W10 ... 9.10

BLACK PLATE (Base Box)

Aliquippa, Pa. J5 ... $8.20
Fairfield, Ala. T2 ... 8.20
Fairless, Pa. U5 ... 8.20
Fontana, Calif. K1 ... 8.85
Gary, Ind. U5 ... 8.20
Granite City, Ill. G4 ... 8.30
Ind. Harbor, Ind. I-2, Y1 8.20
Irvin, Pa. U5 ... 8.20
Niles, O. R2 ... 8.20
Pittsburg, Calif. C11 ... 8.85
Sparrows Point, Md. B2 .. 8.20
Weirton, W. Va. W6 ... 8.20
Yorkville, O. W10 ... 8.20

ELECTRO, TIN-COATED SHEET (20-27 gage; per 100 lb)

Indiana Harb., Ind. Y1 .. $7.90

(21-27 gage; per 100 lb)

Aliquippa, Pa. J5 ... $7.90
Niles, O. R2 ... 7.90

TIN PLATE, HOT DIPPED COMMON COKE

	1.25 lb	1.50 lb
Aliquippa, Pa. J5	$10.40	$10.65
Fairfield, Ala. T2	10.40	10.65
Fairless, Pa. U5	10.40	10.65
Fontana, Calif. K1	11.05	11.30
Gary, Ind. U5	10.40	10.65
Irvin, Pa. U5	10.40	10.65
Pitts., Calif. C11	11.05	11.30
Sp. Pt., Md. B2	10.40	10.65
Weirton, W. Va. W6	10.40	10.65
Yorkville, O. W10	10.40	10.65

HOLLOWARE ENAMELING

(Black plate) (29 Gage)

Aliquippa, Pa. J5 ... 7.85
Gary, Ind. U5 ... 7.85
Granite City, Ill. G4 ... 7.95
Ind. Harbor, Ind. Y1 ... 7.85
Irvin, Pa. U5 ... 7.85
Yorkville, O. W10 ... 7.85

STRIP, C.R., Electrogalvanized

Cleveland A7 ... 4.425*
Dover, O. G6 ... 7.425*
Evanston, Ill. M22 ... 7.525*
McKeesport, Pa. E10 .. 7.50*
New Castle, Pa. M23 ... 7.425*
Riverdale, Ill. A1 ... 7.425*
Warren, O. B9, S3, T5 7.425*
Worcester, Mass. A7 .. 7.975
Youngstown S41 ... 7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren, O. R2 ... 8.175

TIGHT COOPERAGE HOOP

Atlanta A11 ... 5.825
Farrell, Pa. S3 ... 5.525
Riverdale, Ill. A1 ... 5.675
Sharon, Pa. S3 ... 5.525
Youngstown U5 ... 5.525

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
Beech Bottom, W. Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge, Pa. A4	....	....	12.40	13.55	14.65
Granite City Ill. G4	9.875*	11.30*	12.00*	13.15*	....
Indiana Harbor, Ind I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield, O. E6	9.875*	11.70	12.40	13.55	14.65
Newport, Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles, O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift, Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren, O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville, O. A10	....	11.70†	12.40	13.55	14.65

SHEETS (22 Ga., coils & cut lengths)

	Stator
Mansfield, O. E6	8.10
Vandergrift, Pa. U5	8.10
Warren, O. R2 (Locore)	8.10

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
Beech Bottom, W. Va. W10	15.70	16.30	16.80	17.85
Vandergrift, Pa. U5	15.70	16.30	16.80	17.85
Zanesville, O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge, Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler, Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift, Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren, O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. §Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

Alabama City, Ala. R2 ... 8.00
Aliquippa, Pa. J5 ... 8.00
Alton, Ill. L1 ... 8.20
Atlanta A1 ... 8.00
Bartonville, Ill. K4 ... 8.10
Buffalo W12 ... 8.00
Chicago W13 ... 8.00
Cleveland A7, C20 ... 8.00
Crawfordsville, Ind. M8 .. 8.10
Donora, Pa. A7 ... 8.00
Duluth A7 ... 8.00
Fairfield, Ala. T2 ... 8.00
Fostoria, O. (24) S1 ... 8.10
Houston S5 ... 8.25
Jacksonville, Fla. M8 ... 8.35
Johnstown, Pa. B2 ... 8.00
Joliet, Ill. A7 ... 8.00
Kansas City, Mo. S5 ... 8.25
Kokomo, Ind. C16 ... 8.10
Los Angeles B3 ... 8.95
Minnequa, Colo. C10 ... 8.25
Monessen, Pa. P7, P16 .. 8.00
N. Tonawanda S17 ... 8.00
Palmer, Mass. W12 ... 8.30
Pittsburg, Calif. C11 ... 8.95
Portsmouth, O. P12 ... 8.00
S Chicago, Ill. R2 ... 8.00
S. San Francisco C10 ... 8.95
Sparrows Point, Md. B2 .. 8.10
Sterling, Ill. (1) N15 ... 8.00
Sterling, Ill. N15 ... 8.10
Struthers, O. Y1 ... 8.00
Waukegan, Ill. A7 ... 8.00
Worcester, Mass. A7 ... 8.30

WIRE, Cold Heading Carbon

Elyria, O. W8 ... 8.00
Buffalo S47 ... 8.00

Wire, Gal'd., for ACSR

Bartonville, Ill. K4 ... 12.65
Buffalo W12 ... 13.40
Cleveland A7 ... 12.65
Donora, Pa. A7 ... 12.65
Duluth A7 ... 12.65
Johnstown, Pa. (10) B2 .. 12.65
Kansas City, Mo. U3 ... 12.90
Los Angeles (2) B3 ... 13.60
Minnequa, Colo. C10 .. 12.775
Monessen, Pa. P7, P16 .. 12.65
Muncie, Ind. I-7 ... 13.60
New Haven, Conn. A7 ... 12.95
Palmer, Mass. W12 ... 13.70
Pittsburg, Calif. C11 ... 13.45
Portsmouth, O. P12 ... 12.65
Roebling, N.J. R5 ... 12.95
Sparrows Pt., Md. (10) B2 12.75
Struthers, O. Y1 ... 13.40
Trenton, N.J. A7 ... 12.95
Waukegan, Ill. A7 ... 12.65
Worcester, Mass. A7 ... 12.95

WIRE, Upholstery Spring

Aliquippa, Pa. J5 ... 9.75
Alton, Ill. L1 ... 9.95
Buffalo W12 ... 9.75
Cleveland A7 ... 9.75
Donora, Pa. A7 ... 9.75
Duluth A7 ... 9.75
Johnstown, Pa. B2 ... 9.75
Kansas City, Mo. S5, U3 10.00
Kokomo, Ind. C16 ... 9.85
Los Angeles B3 ... 10.70
Minnequa, Colo. C10 ... 9.95
Monessen, Pa. P7, P16 .. 9.75
New Haven, Conn. A7 .. 10.95
Palmer, Mass. W12 ... 10.05
Pittsburg, Calif. C11 .. 10.075
Portsmouth, O. P12 ... 9.75
Roebling, N.J. R5 ... 10.05
S Chicago, Ill. R2 ... 9.75
S San Francisco C10 .. 10.075
Sparrows Pt., Md. B2 ... 9.85
Struthers, O. Y1 ... 9.75
Trenton, N.J. A7 ... 10.05
Waukegan, Ill. A7 ... 9.75
Worcester, Mass. A7, J4, T6 10.05

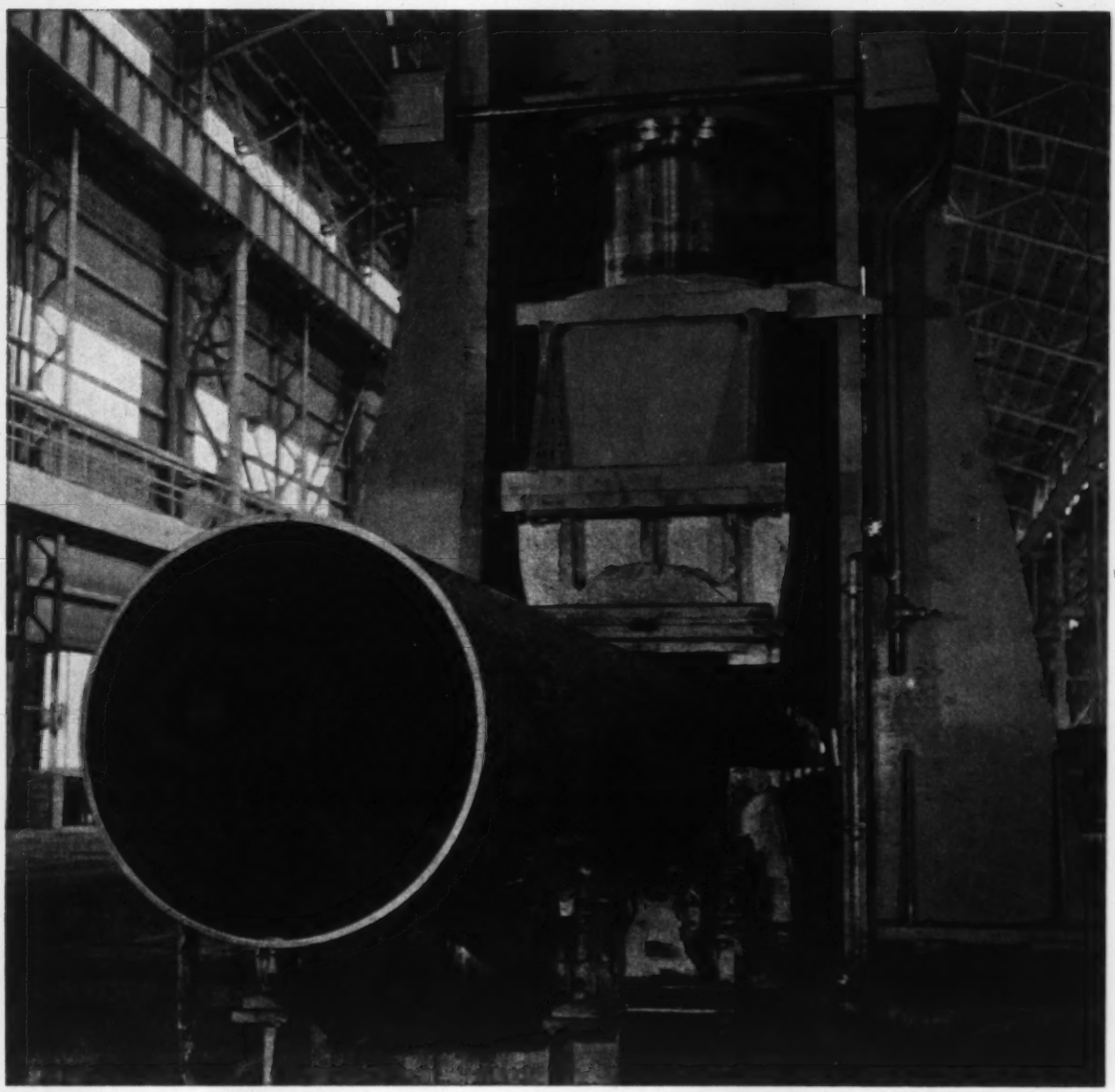
WIRE, Fine & Weaving (8" Coils)

Alton, Ill. L1 ... 16.50
Bartonville, Ill. K4 ... 16.40
Chicago W13 ... 16.30
Cleveland A7 ... 16.30
Crawfordsville, Ind. M8 16.40
Fostoria, O. S1 ... 16.30
Houston S5 ... 16.55
Jacksonville, Fla. M8 .. 16.65
Johnstown, Pa. B2 ... 16.30
Kansas City, Mo. S5 ... 16.55
Kokomo, Ind. C16 ... 16.30
Minnequa, Colo. C16 ... 16.55
Monessen, Pa. P16 ... 16.30
Muncie, Ind. I-7 ... 16.50
Palmer, Mass. W12 ... 16.60
S San Francisco C10 ... 17.15
Waukegan, Ill. A7 ... 16.30
Worcester, Mass. A7, J6 16.60

ROPE WIRE (A)

Bartonville, Ill. K4 ... 13.45
Buffalo W12 ... 13.45
Fostoria, O. S41 ... 13.45
Johnstown, Pa. B2 ... 13.45
Monessen, Pa. P7 ... 13.45
Muncie, Ind. I-7 ... 13.65
Palmer, Mass. W12 ... 13.75
Portsmouth, O. P12 ... 13.45
Roebling, N.J. R5 ... 13.75
St Louis L8 ... 13.45
Sparrows Pt., Md. B2 ... 13.55
Struthers, O. Y1 ... 13.45
Worcester, Mass. J4 ... 13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.



DEPENDABLE NKK LARGE DIAMETER HIGH PRESSURE WELD PIPE

In this age of oil and gas, pipe line is playing increasingly prominent role. Nippon Kokan, with half a century of solid record in pipe-making, is ready to meet increased demands for large diameter high pressure weld pipes. NKK high test line pipes are made to universally accepted API 5LX standards, or similar specifications, in a modern mill equipped with the latest in U-O-E process installation. NKK high test line pipes are 100% dependable in quality, perfectly uniform in analyses, perfectly accurate in wall thickness and outside diameter, perfectly round and straight, perfectly welded. Write for details and catalogs.

Steel : Tubular Products — Bars and Shapes — Plates and Sheets Ship : Shipbuilding & Ship Repairs Fabricated Steel Structures

NKK **NIPPON KOKAN K.K.**
(Japan Steel & Tube Corporation)

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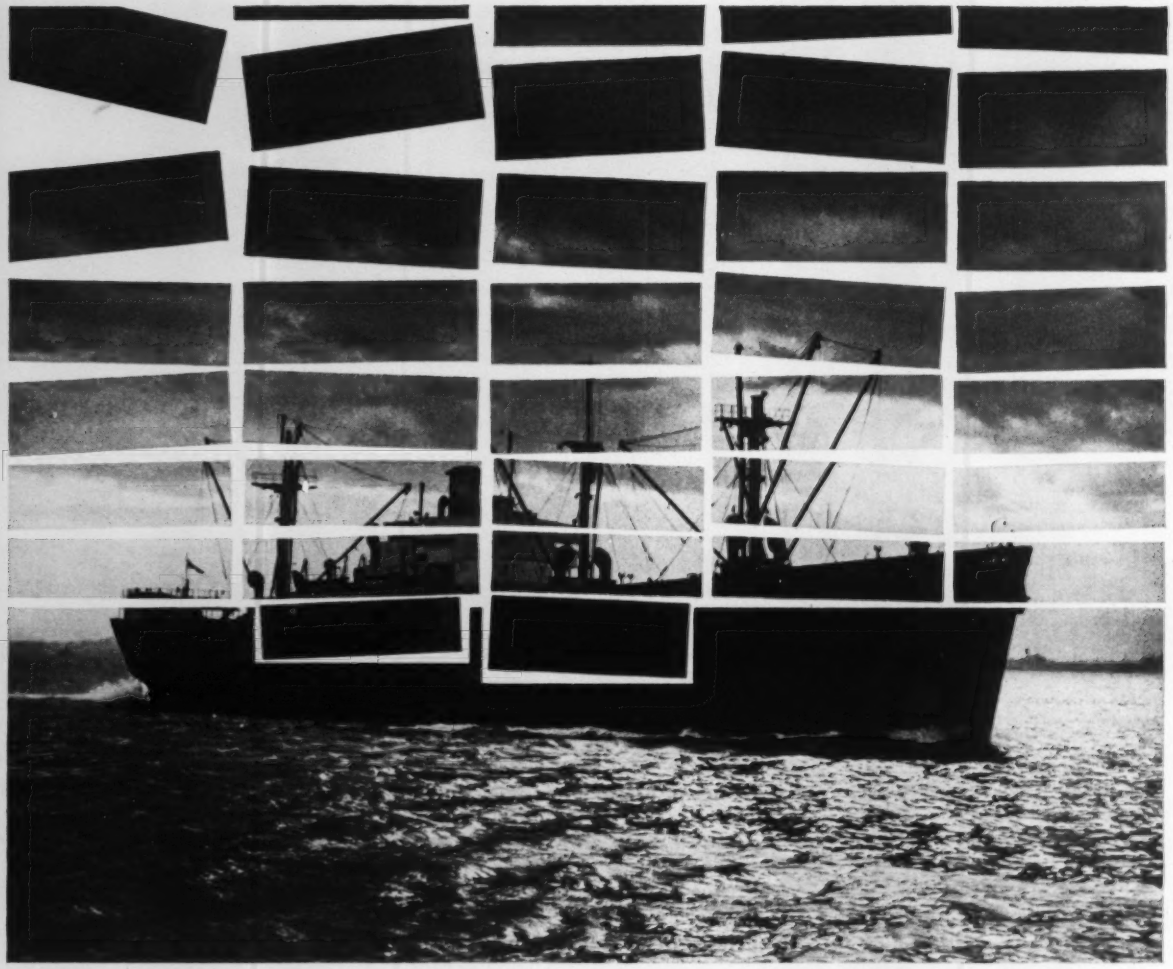


For New York Shipbuilding Corporation,

CORO-GARD® 1706 STOPS PICKLING TANK LEAKS, PUTS PROTECTION ANSWERS IN PLACE!

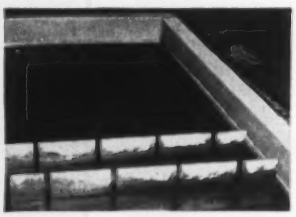
BRAND COATING

New York Shipbuilding Corporation, Camden, N.J., formerly had to repair pickling tank leaks every 4 to 6 weeks. A 15% sulphuric acid solution penetrated the coating then used—caused tank corrosion and leaks. Now, all exposed tank surfaces are protected by CORO-GARD 1706 Brand Coating, and *no leaks have occurred during more than a year's constant contact with the acid solution!*

CORO-GARD 1706 Coating also withstands such corrosive fluids as hydrochloric acid solutions, distilled and salt water, and alkalies, even at continuous heat up to 120°F. It resists attacks by weather, ozone, oxygen and many industrial atmospheres—wards off erosive attack by abrasive-laden liquids. CORO-GARD 1706 Coating is easily applied by brush to unprimed steel, aluminum, copper, galvanized steel, concrete, wood and some plastics. It air-cures to a tough, rubbery protective film.

What can CORO-GARD 1706 protect for you? Call the nearby 3M Field Engineer for technical assistance and information. He can also provide detailed data about hundreds of other 3M adhesive, coating and sealer formulations created to solve specialized problems in protection and fastening. Or write AC&S Division, 3M Co., Dept. SBEE-101, St. Paul 6, Minn.

"CORO-GARD" is a reg. TM of 3M Co.



Pickling tank protected with CORO-GARD 1706 Coating experienced no corrosion, no leaks after more than a year's exposure to 15% solution of sulphuric acid.

ADHESIVES, COATINGS AND SEALERS DIVISION

MINNESOTA MINING AND MANUFACTURING COMPANY

...WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

WIRE, Tire Bead

Bartonville, Ill. K4	17.15
Monessen, Pa. P16	17.15
Roebling, N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson, Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville, Ind. M8	12.35
Dover, O. G6	12.35
Evanston, Ill. M22	12.45
Farrell, Pa. S3	12.35
Fostoria, O. S1	12.35
Franklin Park, Ill. T6	12.45
Kokomo, Ind. C16	12.35
Massillon, O. R8	12.35
Milwaukee C23	12.55
Monessen, Pa. P7, P16	12.35
New Castle, Pa. M23	12.35
Palmer, Mass. W12	12.65
Pawtucket, R.I. N8	12.65
Philadelphia P24	12.65
Riverdale, Ill. A1	12.45
Rome, N.Y. R6	12.35
Sharon, Pa. S3	12.35
Trenton, N.J. R5	12.65
Warren, O. B9	12.35
Worcester, Mass. A7, T6	12.65

NAILS, Stock Sizes

	Col.
Alabama City, Ala. R2	173
Aliquippa, Pa. J5	173
Atlanta A11	173
Bartonville, Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville, Ind. M8	175
Donora, Pa. A7	173
Duluth A7	173
Fairfield, Ala. T2	173
Houston S5	178
Jacksonville, Fla. M8	175
Johnstown, Pa. B2	173
Joliet, Ill. A7	173
Kansas City, Mo. S5	178
Kokomo, Ind. C16	175
Minnequa, Colo. C10	178
Monessen, Pa. P7	173
Pittsburg, Calif. C11	192
Rankin, Pa. A7	173
S. Chicago, Ill. R2	173
Sparrows Pt., Md. B2	175
Sterling, Ill. (7) N15	175
Worcester, Mass. A7	179

(To Wholesalers: per cwt)

Galveston, Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling, W. Va. W10	$10.10

POLISHED STAPLES

	Col.
Alabama City, Ala. R2	175
Aliquippa, Pa. J5	173
Atlanta A11	173
Bartonville, Ill. K4	175
Crawfordsville, Ind. M8	177
Donora, Pa. A7	173
Duluth A7	173
Fairfield, Ala. T2	173
Houston S5	180
Jacksonville, Fla. M8	177
Johnstown, Pa. B2	173
Joliet, Ill. A7	173
Kansas City, Mo. S5	180
Kokomo, Ind. C16	177
Minnequa, Colo. C10	178
Pittsburg, Calif. C11	194
Rankin, Pa. A7	173
S. Chicago, Ill. R2	175
Sparrows Pt., Md. B2	175
Sterling, Ill. (7) N15	175
Worcester, Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb net box) Coil No. 3150

Alabama City, Ala. R2	$8.78
Atlanta A11	10.36
Bartonville, Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville, Ind. M8	8.88
Donora, Pa. A7	8.78
Duluth A7	8.78
Fairfield, Ala. T2	8.78
Houston S5	9.02
Jacksonville, Fla. M8	8.88
Johnstown, Pa. B2	8.78
Joliet, Ill. A7	8.78
Kansas City, Mo. S5	9.02
Kokomo, Ind. C16	8.88
Los Angeles B3	9.20
Minnequa, Colo. C10	8.02
Pittsburg, Calif. C11	9.20
S. Chicago, Ill. R2	8.78
S. San Francisco C10	9.20
Sparrows Pt., Md. B2	8.88
Sterling, Ill. (37) N15	8.88

Coil No. 6500 Stand. 100 lb coil

Alabama City, Ala. R2	$9.06
Atlanta A11	10.70
Bartonville, Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville, Ind. M8	9.16
Donora, Pa. A7	9.06
Duluth A7	9.06
Fairfield, Ala. T2	9.06
Houston S5	9.30
Jacksonville, Fla. M8	9.16
Johnstown, Pa. B2	9.06
Joliet, Ill. A7	9.06
Kansas City, Mo. S5	9.30
Kokomo, Ind. C16	9.16
Los Angeles B3	9.50
Minnequa, Colo. C10	9.30
Pittsburg, Calif. C11	9.50
S. Chicago, Ill. R2	9.06
S. San Francisco C10	9.50
Sparrows Pt., Md. B2	9.16
Sterling, Ill. (37) N15	9.16

Coil No. 6500 Interim 100 lb coil

Alabama City, Ala. R2	$9.11
Atlanta A11	10.75
Bartonville, Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville, Ind. M8	9.21
Donora, Pa. A7	9.11
Duluth A7	9.11
Fairfield, Ala. T2	9.11
Houston S5	9.35
Jacksonville, Fla. M8	9.21
Johnstown, Pa. B2	9.11
Joliet, Ill. A7	9.11
Kansas City, Mo. S5	9.35
Kokomo, Ind. C16	9.21
Los Angeles B3	9.55
Minnequa, Colo. C10	9.35
Pittsburg, Calif. C11	9.55
S. Chicago, Ill. R2	9.11
S. San Francisco C10	9.55
Sparrows Pt., Md. B2	9.21
Sterling, Ill. (37) N15	9.21

BALE TIES, Single Loop

	Col.
Alabama City, Ala. R2	212
Atlanta A11	212
Bartonville, Ill. K4	214
Crawfordsville, Ind. M8	214
Donora, Pa. A7	212
Duluth A7	212
Fairfield, Ala. T2	212
Houston S5	217
Jacksonville, Fla. M8	214
Joliet, Ill. A7	212
Kansas City, Mo. S5	217
Kokomo, Ind. C16	214
Minnequa, Colo. C10	217
Sparrows Pt., Md. B2	214
Sterling, Ill. (7) N15	214

WIRE, Barbed

	Col.
Alabama City, Ala. R2	193**
Aliquippa, Pa. J5	190§
Atlanta A11	197*
Bartonville, Ill. K4	199
Crawfordsville, Ind. M8	198
Donora, Pa. A7	193†
Duluth A7	193†
Fairfield, Ala. T2	193†
Houston S5	198**
Jacksonville, Fla. M8	198
Johnstown, Pa. B2	196§
Joliet, Ill. A7	193†
Kansas City, Mo. S5	198**
Kokomo, Ind. C16	195†
Minnequa, Colo. C10	198**
Monessen, Pa. P7	196§
Pittsburg, Calif. C11	213†
Rankin, Pa. A7	193†
S. Chicago, Ill. R2	193**
Sparrows Point, Md. B2	198§
Sterling, Ill. (7) N15	198

WIRE (16 gage Stone)	An'ld Stone	Galv. Stone
Ala. City, Ala. R2	17.85	19.40**
Aliq'ppa, Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria, O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	17.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan. City, Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'im'r, Mass. W12	19.10	19.70†
Pitts., Calif. C11	18.20	19.75†
S. San Fran. C10	18.20	19.75**
Sparrows Pt. B2	17.95	19.75§
St'ling (37) N15	17.95	19.80
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

FENCE POSTS

	Col.
Birmingham C15	177
Chicago Hts., Ill. C2, I-2	177
Duluth A7	177
Franklin, Pa. F5	177
Johnstown, Pa. B2	177
Marion, O. P11	177
Minnequa, Colo. C10	182
Tonawanda, N.Y. B12	177

WOVEN FENCE, 9-15 Ga.

	Col.
Ala. City, Ala. R2	187**
Aliq'ppa, Pa. 9-11½ Ga. J5	190§
Atlanta A11	191*
Bartonville, Ill. K4	193
Crawfordsville, Ind. M8	192
Donora, Pa. A7	187†
Duluth A7	187†
Fairfield, Ala. T2	187†
Houston S5	192**
Jacksonville, Fla. M8	192
Johnstown, Pa. (42) B2	190§
Joliet, Ill. A7	187†
Kansas City, Mo. S5	192**
Kokomo, Ind. C16	189†
Minnequa, Colo. C10	192**
Pittsburg, Calif. C11	210†
Rankin, Pa. A1	187†
S. Chicago, Ill. R2	187**
Sterling, Ill. (7) N15	192

WIRE, Merchant Quality 6 to 8 gage

	An'ld	Galv.
Ala. City, Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta (48) A11	9.00	9.75*
Bartonville (48) K4	9.10	9.85
Buffalo W12	9.00	9.55†
Chicago W13	9.00	9.55**
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80††
Donora, Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55
Houston (48) S5	9.25	9.80**
Jack'vill, Fla. M8	9.10	9.80‡‡
Johnstown (48) B2	9.00	9.675§
Joliet, Ill. A7	9.00	9.55†
Kansas City (48) S5	9.25	9.80**
Kokomo (48) S16	9.10	9.65†
Los Angeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen (48) P7	8.65	9.35§
Palmer, Mass. W12	9.30	9.85†
Pitts., Calif. C11	9.95	10.50†
Rankin, Pa. A7	9.00	9.55†
S. Chicago R2	9.00	9.55**
S. San Fran. C10	9.95	10.50**
Spar'wsPt. (48) B2	9.10	9.775§
St'ling (37) (48) N15	9.10	9.80
Struthers, O. Y1	9.00	9.65‡
Worcester, Mass. A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

FASTENERS

SCREWS, NUTS, BOLTS

(Consumer discounts per cent off list prices, plain finishes. For less than full container quantities, add 25 per cent; attaching nuts to bolts in sizes ¼ in. through ⅝ in. diameter through 8 in. in length, price on application. Discounts are determined by the quantity of screws, nuts, and bolts ordered for one destination at one time.)

Base, one keg	43.00
20,000 lb or more	53.00

SCREWS, SETSCREWS

Hex Screws and High Strength Hex Screws, through 1 in. x 12 in.:

Base, one keg	43.00
20,000 lb or more	53.00

Hex Screws 1⅛ in. diameter and larger: See net price schedule.

Fillister Head Screws, coarse thread:

Packages	+70.00
Bulk	+28.00

Flat Head Screws, coarse thread:

Packages	+100.00
Bulk	+52.00

Setscrews, Square Head, Cup-point, coarse thread:

Packages	+10.00
Bulk	15.00

(Bulk discounts on fillister, flat head, and set screws apply only to products ordered in these minimum quantities: ¼ in. through ⅝ in. diameter, 15,000 pieces; ¾ in. through ⅞ in. diameter, 5000 pieces; and 1 in. through 1 in. diameter, 2000 pieces.)

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburg, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in. larger 12.85
7/16 in. and smaller by 6 in. and shorter, 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over.)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$33.50	$47.90	$61.30	$80.30
Kansas City, Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa, Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg, Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling, N.J. R5	26.20	38.50	47.90	61.30	80.30
Sparrows Point, Md. B2	26.20	38.50	47.90	61.30	80.30
St. Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan, Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2½	12	49.24	57.72	43.70
2¾	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer, Pa. U5	5.75	5.65	....	6.725
Ensley, Ala. T2	5.75	5.65	....	6.725
Fairfield, Ala. T2	....	....	....	6.725
Gary, Ind. U5	5.75	5.65	....	....
Huntington, W. Va. C15	....	....	....	6.725
Johnstown, Pa. B2	....	....	....	(16) 6.725
Lackawanna, N.Y. B2	5.75	5.65	....	6.725
Minnequa, Colo. C10	5.75	5.65	....	7.725
Steelton, Pa. B2	5.75	5.65	....	....

TIE PLATES

Fairfield, Ala. T2	6.875
Gary, Ind. U5	6.875
Lackawanna, N.Y. B2	6.875
Minnequa, Colo. C10	6.875
Seattle B3	7.025
Steelton, Pa. B2	6.875
Torrance, Calif. C11	7.025

JOINT BARS

Bessemer, Pa. U5	7.25
Fairfield, Ala. T2	7.25
Joliet, Ill. U5	7.25
Lackawanna, N.Y. B2	7.25
Minnequa, Colo. C10	7.25
Steelton, Pa. B2	7.25

AXLES

Ind. Harbor, Ind. S13	9.125
Johnstown, Pa. B2	9.125

SCREW SPIKES

Lebanon, Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
Kansas City, Mo. S5	15.35
Lebanon, Pa. B2	15.35
Minnequa, Colo. C10	15.35
Pittsbugh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield, Ala. T2	10.10
Ind. Harbor, Ind. I-2, Y1	10.10
Kansas City, Mo. S5	10.10
Lebanon, Pa. B2	10.10
Minnequa, Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S. Chicago, Ill. R2	10.10
Struthers, O. Y1	10.10
Youngstown R2	10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38 13 Ga. & lighter 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.625c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.25	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling Ingot	Rerolling Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	H.R. Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	41.50	43.50	39.25	48.50	43.50
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	46.75
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	45.00
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
304L	....	....	37.25	47.25	48.25	52.00	54.50	50.00	59.75	57.25
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	76.75
316L	....	....	72.25	76.25	79.50	83.50	79.50	88.50	84.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	62.25
330	....	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 Cb-Ta	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	75.25
403	....	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	38.75
430F	....	....	....	30.50	....	34.25	36.00	31.75	51.75	42.00
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Elwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Phoenix Steel Corp.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloy Steel Co., Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates: Carbon Base 5%	Plates: Carbon Base 10%	Plates: Carbon Base 15%	Plates: 20%	Sheets: Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	28.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base—Cold Rolled—10%	Strip, Carbon Base—Cold Rolled—Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Claymont, Del. P4; Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham District				
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
NorthTonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
SouthChicago, Ill. R2	66.00	66.50	66.50	67.00
SouthChicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
NevilleIsland, Pa. P8	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W.Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	...	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Other U. S. Districts				
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
PortColborne, Ont. A25	65.00	65.00	65.50	66.00
SaultSte. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%. Foundry grade, 1.75% or under, deduct 50c.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
PortColborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Chicago I-3 (Phos. 0.075% max)	71.00
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Phos. 0.075% max)	71.00
Erie, Pa. I-3 (Phos. 0.075% max)	71.00
NevilleIsland, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	9.50	10.26	10.06	11.25	9.65	11.70	16.38	9.85	9.60	11.10
Birmingham	8.46	10.20	10.59	9.45	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.90	10.40	11.52	12.40	10.05	13.35	16.59	10.50	9.83	11.85
Buffalo	9.30	10.05	11.80	11.70	9.45	11.45	16.30	9.90	9.40	11.80
Charlotte, N. C.	9.95	11.22	10.55	11.35	10.00	12.68	....	10.20	9.95	11.75
Chicago	9.22	10.20	10.13	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.38	10.26	10.18	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	9.07	9.88	11.75	10.63	8.48	12.98	16.95	8.71	8.31	9.68
Detroit	9.48	10.46	10.50	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	8.67	9.48	11.35	10.23	8.08	13.10	16.55	8.31	8.00	9.28
Indianapolis	9.66	10.64	10.57	11.83	9.66	11.09	16.39	10.01	8.20	11.79
KansasCity	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.27	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.57	10.55	10.48	11.74	9.57	11.00	16.30	9.92	9.41	11.70
Newark, N. J.	9.81	10.34	11.54	12.37	10.05	13.25	16.40	10.35	9.79	11.82
New York	10.07	10.78	11.35	12.37	10.44	13.25	16.40	10.90	10.22	11.82
Philadelphia	9.50	10.00	10.66	11.25	9.65	11.95	16.38	9.85	9.60	11.10
Pittsburgh	9.22	10.53	11.68	11.49	9.22	11.25	15.95	9.57	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	10.51	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	8.82	9.49	10.64	10.99	8.82	11.49	16.54	9.17	8.66	10.95
San Francisco	10.65	11.65	11.75	12.70	10.55	15.10	17.25	11.10	10.80	12.95
Seattle	11.35	12.45	13.40	12.80	10.80	16.20	17.85	11.50	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.20	17.85	11.35	10.80	13.45

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ⅝ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plate, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hitchins, Olive Hill, Ky., Athens, Troup, Tex., Clearfield, Curwensville, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., Frostburg, Md., $133; Templeton, Pa., $135; Salina, Pa., $138; Niles, Ohio, $139; Lehi, Utah, $175.

Super-Duty: Ironton, Ohio, St. Louis, Mexico, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Frostburg, Md., $200; Stevens Pottery, Ga., $210; Troup, Tex., $215; Lehi, Utah, $263.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Hawstone, Thompsontown, Pa., Ensley, Ala., Portsmouth, Ohio, St. Louis, $158; Warren, Niles, Windham, Ohio, $163; E. Chicago, Ind., Joliet, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $133; Philadelphia, Clearfield, Pa., $138; Warren, Ohio, $148.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Johnstown, Pa., Vandalia, Mo., $97; Chester, New Cumberland, W. Va., Freeport, Vanport, Merrill Station, Clearfield, Pa., Wellesville, Irondale, New Salisbury, Ohio, $100; Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120; Lehi, Utah, $175.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo. $250; Danville, Ill., $253; Fords, N. J., Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., Frostburg, Md., $260; Troup, Tex., $265.

60 *Per cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $320; Troup, Tex., Fords, N. J., Philadelphia, $325.

70 *Per cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $360; Troup Tex., Fords, N. J., Philadelphia, $365.

Tar Bonded Brick (per ton)

Dolomite: Nario, Ohio, $87.50. Dolomite-Magnesite: Hays, Pa., Hammond, Ind., $107; Nario, Ohio, $109.50. Magnesite: Nario, Ohio, $128; Hays, Pa., Hammond, Ind., $130.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310; Reesdale, Pa., $355.

Runners (per 1000)

Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234; Reesdale, Pa., $245.

Dolomite (per ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Nario, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines, Chewelah, Wash., $46; minus ⅝ in. grains bulk, Luning, Nev., $46; ⅝ in. grains with fines (periclase), Baltimore, $73, Pascagoula, Miss., $90.

*—9 in. x 4½ x 2.50 straights.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches		Per
Diam	Length	100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5⅛	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:

Sheets & Coils, Electrical:
Field grade 9.00
Electrical grade 10.15
Sheet Piling 6.15
Skelp 4.70
Rails, Heavy 5.55
Rails, Light 5.70
Joint Bars 6.55
Tie Plates 6.35
Grinding Balls (3 in. diam.) 7.00

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh bags	7.50††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	27.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe...36.75, ton deld. east of Mississippi.	
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh) ...	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 42.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	37.80
Bronze powder, 90/10.	56.80
Copper, all types 15.00*	
Lead	7.50*
Manganese, 500 lb and up 25.00*	
Nickel, all types ...0.78-1.06	
Nickel-Silver	56.00
Solder	7.00*
Stainless Steel, 304 ...	59.00
Stainless Steel, 316 ...	$1.07
Steel, AISI 4600	32.00
Tin 14.00*	
Zinc	23.20
Cobalt:	Dollars
98.5%, minus 100-300 mesh ..1.57-1.58	
99.5% below 5 microns	2.32
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. (Source of shipment: Western Continental Europe.)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305 ...	$5.15	....	$5.10	$5.00	$5.30
Bar Size Angles	5.15	....	5.10	5.00	5.30
Structural Angles	5.05	....	5.00	4.90	5.20
I-Beams	5.05	....	5.00	4.90	5.20
Channels	5.15	....	5.10	5.00	5.30
Plates (basic bessemer)	5.30	....	5.25	5.15	5.45
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	24.16	....	24.09	23.81	25.54
Barbed Wire (†)	6.25	....	6.20	6.10	6.40
Merchant Bars	5.15	....	5.10	5.00	5.30
Hot-Rolled Bands	5.65	....	5.60	5.50	5.80
Wire Rods, Thomas No. 5 (Niederrhein)	5.80*	....	5.75	5.75	6.00
Wire Rods, O.H., No. 5 (Niederrhein)	6.00*	....	5.95	5.95	6.20
Bright Common Wire Nails (§)	7.15	....	7.10	7.00	7.30
(Source of Shipment: Japan)					
Wire, galvanized	$8.62	....	$8.62	$8.62	$8.57
Wire, bright	7.60	....	7.60	7.60	7.55
Wire Rods, O.H. No. 5 (Sumitomo)	5.80	....	5.80	5.75	6.00
Strand, stress relieved (Sumitomo)					
⅜ in. diam, 1000 lineal ft	39.90	....	39.90	39.90	39.50
7/16 in. diam, 1000 lineal ft	53.50	....	53.50	53.50	53.00
Bright common wire nails	7.15	....	7.15	7.15	7.15

†Per 82 lb net reel. §Per 100 lb keg, 20d and heavier. *Except Boston.

Ores

Lake Superior Iron Ore

(Prices effective for the 1961 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi nonbessemer	$11.45
Mesabi bessemer	11.60
Old Range nonbessemer	11.70
Old Range bessemer	11.85
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1961; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports 25.00†
Chilean, 62-65%, c.i.f. Atlantic ports . 22.00
Brazilian (lump), 68.5%, f.o.b. vessel, Victoria, per ton $11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality $14.75-15.00*
Domestic, concentrates, f.o.b. milling points 22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 82.00-85.00c nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1 ..... $34.00-35.00†
48% no ratio ..... 25.00-26.00†

South African Transvaal

44% no ratio 18.75
48% no ratio ..... 24.00-26.00†

Turkish

48% 3:1 ..... 35.00-37.00†

Domestic

Rail nearest seller

18% 3:1 ..... 30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.40

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

60% min $4.15-4.40
65% min 4.50-4.75

Vanadium Ore

Cents per lb V_2O_5

Domestic 31.00

*Before duty. †Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa. furnace $14.75-15.25
Connellsville, Pa. foundry 18.00-18.50

Oven Foundry

Birmingham, ovens $30.35
Cincinnati, deld. 33.34
Buffalo, ovens 32.00
Chattanooga, Tenn., ovens 30.80
Detroit, ovens 32.00
Pontiac, Mich., deld. 34.05
Saginaw, Mich., deld. 35.63
Erie, Pa., ovens 32.00
Indianapolis, ovens 31.25
Ironton, Ohio, ovens 30.50
Cincinnati, deld. 33.64
Kearny, N. J., ovens 31.25
Milwaukee, ovens 32.00
Neville Island (Pittsburgh), Pa., ovens.. 30.75
New Haven, Conn., ovens 31.00
Painesville, Ohio, ovens 32.00
Cleveland, deld. 34.45
Philadelphia, ovens 31.00
St. Louis, ovens 33.00
St. Paul, ovens 31.25
Chicago, deld. 34.78
Swedeland, Pa., ovens 31.00
Terre Haute, Ind., ovens 31.25

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene 34.00
Xylene, industrial grade 29.00
Creosote 24.00
Naphthalene, 78 deg. 6.00
Toluene, one deg. (deld. east of Rockies) 25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade 14.75

Per ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade $32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa., 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220. Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3% for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max), Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%), Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16%, deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 5% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.27, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 24.00c per lb of contained Cr. Delivered.

Charge Chrome: Cr 58-65%, C 5.25% max, Si 3% max, S 0.03% max, 22.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, S 0.03% max, 23.00c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 58-65%, C 4.25% max, Si 1.0% max, S 0.03% max, 24.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Low-Carbon Ferrochrome: (Simplex) Cr 68-71%; C 0.025% max, 33.00c; C 0.010% max, 33.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Cr 68-73%; C 0.25% max, 33.50c. Cr 67-73% C 0.05% max, 33.00c; C 0.75% max, 33.00c; C 2.0% max, 32.5c, carlots, lump, bulk, delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25 max). 8M x D, carload, bulk, 36.50c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 11.50c per lb material; Cr 44-47%, Si 37-39%, C 0.15% max, 12.60c per lb material.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 13.5c per lb contained Si. Packed, c.l. 16.0c, ton lot 17.45c, less ton 19.1c f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.35c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). $2.45 per lb (all quantities) of contained W. Delivered.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.60 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.06 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l., packed 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-S Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-70%). Per lb of contained Mo in 2000-lb container, f.o.b. Langeloth and Washington, Pa., $1.89 in all sizes except powdered which is $1.95.

Technical Molybdic-Oxide: Per lb of contained Mo. in cans $1.60; in bags, $1.59, f.o.b. Langeloth and Washington, Pa.

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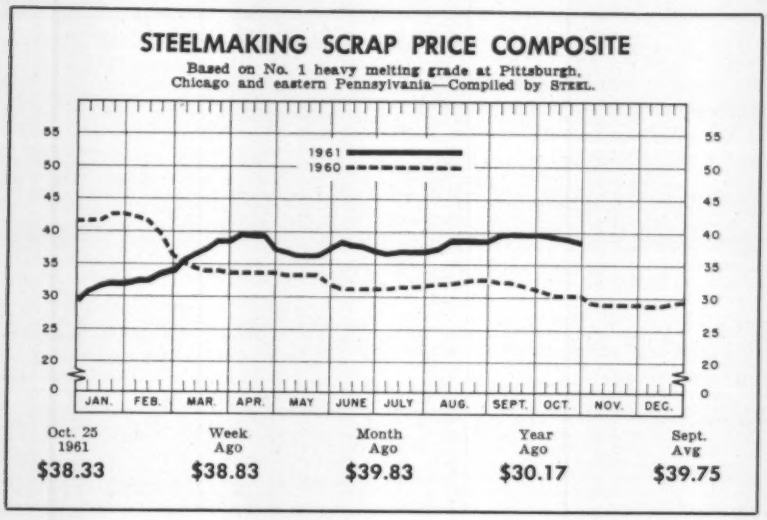


Price Decline in Scrap Continues

Disappointing demand from domestic mills and slower exports are pushing the market down. STEEL's composite slips another 50 cents a ton to $38.33

Scrap Prices, Page 106

● **Chicago**—With the steel ingot rate barely holding, and prospects dim for any appreciable improvement the rest of this year, the scrap market is further depressed. Major mills are not only out of the market, but they are restricting the number of cars they'll accept on outstanding orders. As a result, the market is off about $1 a ton, with No. 1 heavy melting now at the lowest level since late July. It is $3 under the price it commanded in September. The cast iron grades are also off $1, as foundries operate on restricted schedules and meager backlogs.

● **New York**—Despite a continued easy market undertone, brokers' buying prices remain unchanged on the major grades. However, 18-8 sheets, clips, and solids have dropped further to $155-$160, and other stainless scrap grades are weak, except possibly 430 chrome material.

● **Philadelphia**—Prices on the major grades of open hearth scrap are off 50 cents to $1 a ton. The situation reflects slackening in demand on both domestic and foreign account. No. 1 heavy melting is holding at $40, delivered, No. 2 heavy melting at $36, No. 1 bundles and No. 1 busheling at $42, electric furnace bundles at $44, and low phos structurals and plates at $44-$45. Other grades are easy, but unchanged. Mixed borings and heavy turnings are nominal, as are drop broken machinery and malleable.

● **Pittsburgh**—Prices of most grades are unchanged, but market sentiment is weaker. Local mills are disappointed by automotive steel demand and anticipate buying less scrap for November than they did in October. Brokers' bids on the November list of No. 1 factory bundles from the West Mifflin, Pa., plant of GM's Fisher Body Div. are expected to be lower than last month's.

● **Cleveland** — Sliding steelmaking operations here and in the Valley are contributing to the gloomy sentiment in the scrap market. Some traders anticipate a drop of $2 to $3 a ton on the major steelmaking grades when the next representative mill orders are placed. Much depends on how the November automotive lists go.

● **Buffalo**—Prices on the primary mill grades are off, but advances have been reported on cast iron scrap. The price of No. 1 heavy melting and other steel grades fell $1 a ton last week due to reduced demand outside the district and a poor market in the Buffalo area. Railroad scrap is also off $1 a ton. However, the cast grades are up $1 as result of new sales to local foundries on the basis of $39 for the cupola grade. Canadian demand for cast is giving the local market some strength.

● **Cincinnati**—A district mill is expected to enter the market for tonnage this week, but traders think it will pay $1-$2 a ton less than it did a month ago. For the present, the market is unchanged.

● **St. Louis**—The market is inactive, and prices are soft. One local mill has held up shipments because of slower steel production, and another cut its intake. Much scrap is coming into the area from Chicago and is hurting district prices. Lower prices are being predicted for next month. Four categories of open hearth scrap slipped last week, all $1 a ton: No. 2 bundles to $23, No. 1 busheling to $34, machine shop turnings to $14.50, and shoveling turnings to $16.50.

● **Birmingham** — Prices are unchanged, but the market tone is weak. Export volume is diminishing—Japan is not taking as much material as it did. Prices on the cast on grades are weak. It's rumored that a Tennessee soil pipe producer is considering halting operations for a time.

● **Houston**—Prices on specially prepared grades of mill scrap are off $2 a ton on new orders placed for November delivery. Export buying is slow. Brokers and consumers predict a relatively soft market for the rest of this year. Intake over the scale is rising.

● **Seattle** — Prices continue firm. Domestic buying is more active, and material is moving steadily on foreign account. Heavy melting grades are still in short supply, but No. 2 bundles are readily available. Exports continue to provide chief market support.

● **Los Angeles**—The market is at

(*Please turn to Page* 107)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Oct. 25, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Oct. 25	$38.33
Oct. 18	38.83
Sept. Avg.	39.75
Oct. 1960	30.04
Oct. 1956	57.27

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	37.00-38.00
No. 2 heavy melting	29.00-30.00
No. 1 dealer bundles	38.00-39.00
No. 2 bundles	26.00-27.00
No. 1 busheling	37.00-38.00
No. 1 factory bundles	44.00-45.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Shovel turnings	20.00-21.00
Cast iron borings	19.00-20.00
Cut structurals:	
2 ft and under	43.00-44.00
3 ft and under	40.00-41.00
Heavy turnings	31.00-32.00
Punchings & Plate scrap	45.00-46.00
Electric furnace bundles	42.00-43.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	34.00-35.00
Stove plate	34.00-35.00
Unstripped motor blocks	24.00-25.00
Clean auto cast	35.00-36.00
Drop broken machinery	47.00-48.00‡

Railroad Scrap

No. 1 R.R. heavy melt.	43.00-44.00
Rails, 2 ft and under	51.00-52.00
Rails, 18 in. and under	52.00-53.00
Random rails	46.00-47.00
Angles, splice bars	44.00-45.00
Railroad specialties	48.00-49.00
Rails, rerolling	58.00-59.00

Stainless Steel Scrap

18-8 bundles & solids	190.00-195.00
18-8 turnings	115.00-120.00
430 bundles & solids	90.00-95.00
410 turnings	55.00-60.00

CHICAGO

No. 1 hvy melt., indus.	*38.00-39.00*
No. 1 hvy melt., dealer	*36.00-37.00*
No. 2 hvy melting	*32.00-33.00*
No. 1 factory bundles	*41.00-42.00*
No. 1 dealer bundles	*38.00-39.00*
No. 2 bundles	*22.00-23.00*
No. 1 busheling, indus.	*38.00-39.00*
No. 1 busheling, dealer	*36.00-37.00*
Machine shop turnings	17.00-18.00
Mixed borings, turnings	19.00-20.00
Shovel turnings	20.00-21.00
Cast iron borings	19.00-20.00
Cut structurals, 3 ft	*44.00-45.00*
Punchings & plate scrap	*46.00-47.00*

Cast Iron Grades

No. 1 cupola	*41.00-42.00*
Stove plate	*35.00-36.00*
Unstripped motor blocks	*33.00-34.00*
Clean auto cast	*46.00-47.00*
Drop broken machinery	*46.00-47.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*40.00-41.00*
R. R. malleable	*46.00-47.00*
Rails, 2 ft and under	*49.00-50.00*
Rails, 18 in. and under	*51.00-52.00*
Angles, splice bars	*44.00-45.00*
Axles	*55.00-56.00*
Rails, rerolling	*58.00-59.00*

Stainless Steel Scrap

18-8 bundles, solids	185.00-190.00
18-8 turnings	105.00-110.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

BUFFALO

No. 1 heavy melting	*31.00-32.00*
No. 2 heavy melting	26.00-27.00
No. 1 bundles	*31.00-32.00*
No. 2 bundles	24.00-25.00
No. 1 busheling	*31.00-32.00*
Shovel turnings	17.00-18.00
Machine shop turnings	13.00-14.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	*39.00-40.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	*38.00-39.00*
No. 1 machinery	*45.00-46.00*

Railroad Scrap

Rails, random lengths	*42.00-43.00*
Rails, 3 ft and under	*48.00-49.00*
Railroad specialties	*41.00-42.00*
Rails, rerolling	64.00-65.00

CLEVELAND

No. 1 heavy melting	*34.00-35.00*
No. 2 heavy melting	24.00-25.00†
No. 1 factory bundles	*37.00-38.00*
No. 1 bundles	*34.00-35.00*
No. 2 bundles	23.00-24.00†
No. 1 busheling	*34.00-35.00*
Machine shop turnings	15.00-16.00
Shovel turnings	19.00-20.00
Mixed borings, turnings	19.00-20.00
Cast iron borings	19.00-20.00
Cut foundry steel	*34.00-35.00*
Cut structurals, plate 2 ft and under	*39.00-40.00*
Low phos. punchings & plate	*34.00-35.00*
Alloy free, short shovel turnings	20.00-21.00
Electric furnace bundles	*34.00-35.00*

Cast Iron Grades

No. 1 cupola	37.00-38.00
Charging box cast	26.00-27.00
Heavy breakable cast	26.00-27.00
Stove plate	34.00-35.00
Unstripped motor blocks	*27.00-28.00*
Brake shoes	37.00-38.00
Clean auto cast	*39.00-40.00*
Burnt cast	30.00-31.00
Drop broken machinery	45.00-46.00

Railroad Scrap

R.R. malleable	*48.00-49.00*
Rails, 2 ft and under	*48.00-49.00*
Rails, random lengths	*45.00-46.00*
Rails, 18 in. and under	*50.00-51.00*
Cast steel	*37.00-38.00*
No. 1 railroad cast	44.00-45.00
Railroad specialties	*44.00-45.00*
Angles, splice bars	*42.00-43.00*
Rails, rerolling	*52.00-53.00*

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	*155.00-160.00*
18-8 turnings	*85.00-90.00*
430 clips, bundles, solids	80.00-85.00
430 turnings	15.00-25.00†

YOUNGSTOWN

No. 1 heavy melting	*37.00-38.00*
No. 2 heavy melting	*23.00-24.00*
No. 1 busheling	*37.00-38.00*
No. 1 bundles	*37.00-38.00*
No. 2 bundles	*23.00-24.00*
Machine shop turnings	*15.00-16.00*
Shovel turnings	*20.00-21.00*
Cast iron borings	*20.00-21.00*
Low phos.	*38.00-39.00*
Electric furnace bundles	*38.00-39.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*37.00-38.00*

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	28.00-29.00
No. 1 bundles	36.00-37.00
No. 2 bundles	21.00-22.00
No. 1 busheling	35.00-36.00
Machine shop turnings	9.00-10.00
Mixed borings, turnings	12.00-13.00
Shovel turnings	14.00-15.00
Cast iron borings	14.00-15.00
Low phos., 18 in.	40.00-41.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Heavy breakable cast	30.00-31.00
Charging box cast	34.00-35.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	40.00-41.00
Rails, 18 in. and under	48.00-49.00
Rails, random lengths	42.00-43.00

DETROIT (Brokers' buying prices)

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	33.00-34.00
No. 2 bundles	23.00-24.00
No. 1 busheling	31.00-32.00
Machine shop turnings	10.00-11.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00

Cast Iron Grades

No. 1 cupola	33.00-34.00
Mixed cast	30.00-31.00
Stove plate	28.00-29.00
Heavy breakable	27.00-28.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	39.00-40.00

Stainless Steel Scrap

18-8 bundles & solids	165.00-170.00
18-8 turnings	75.00-80.00
430 bundles & solids	70.00-75.00

PHILADELPHIA

No. 1 heavy melting	*40.00*
No. 2 heavy melting	*36.00*
No. 1 bundles	*42.00*
No. 2 bundles	26.00-27.00
No. 1 busheling	*42.00*
Electric furnace bundles	*44.00*
Mixed borings, turnings	17.00†
Shovel turnings	20.00
Machine shop turnings	14.00
Heavy turnings	25.00†
Structurals & plates	*44.00-45.00*
Couplers, springs, wheels	46.00
Rail crops, 2 ft & under	52.00-54.00

Cast Iron Grades

No. 1 cupola	40.00
Heavy breakable cast	41.00-42.00
Drop broken machinery	49.00-50.00†
Malleable	49.00†

NEW YORK (Brokers' buying prices)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	30.00-31.00
No. 2 bundles	20.00-21.00
Machine shop turnings	4.50-5.00†
Mixed borings, turnings	5.00-5.50†
Shovel turnings	6.00-7.00†
Low phos. structurals & plates	34.00-35.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	32.00-33.00

Stainless Steel

18-8 sheets, clips, solids	*155.00-160.00*
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

ST. LOUIS (Brokers' buying prices)

No. 1 heavy melting	34.00
No. 2 heavy melting	29.00
No. 1 bundles	33.00
No. 2 bundles	*23.00*
No. 1 busheling	*34.00*
Machine shop turnings	*14.50*
Shovel turnings	*16.50*

Cast Iron Grades

No. 1 cupola	*35.00*
Charging box cast	34.00
Heavy breakable cast	32.00
Unstripped motor blocks	34.00
Clean auto cast	37.00
Stove plate	*31.00*

Railroad Scrap

No. 1 R.R. heavy melt.	37.00
Rails, random lengths	42.00
Rails, rerolling	55.00
Rails, 18 in. and under	*44.00*
Railroad specialties	*41.00*
Angles, splice bars	40.00†

BIRMINGHAM

No. 1 heavy melting	38.00-39.00
No. 2 heavy melting	30.00-31.00
No. 1 bundles	38.00-39.00
No. 2 bundles	22.00-23.00
No. 1 busheling	40.00-41.00
Cast iron borings	10.00-11.00
Machine shop turnings	18.00-19.00
Shovel turnings	20.00-21.00
Bar crops and plate	44.00-45.00
Structurals & plate	44.00-45.00
Electric furnace bundles	40.00-41.00
Electric furnace:	
3 ft and under	37.00-38.00
2 ft and under	39.00-40.00

Cast Iron Grades

No. 1 cupola	41.00-42.00
Stove plate	41.00-42.00
Unstripped motor blocks	30.00-31.00
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R. R. heavy melt.	39.00-40.00
Rails, rerolling	51.00-52.00
Rails, 2 ft and under	46.00-47.00
Rails, random lengths	42.00-43.00
Angles, splice bars	43.00-44.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	*36.00*
No. 2 heavy melting	*33.00*
No. 1 bundles	38.00-39.00
No. 2 bundles	24.00-25.00
Machine shop turnings	12.50-13.00
Crushed turnings	19.00
Low phos. plate & structurals:	
3 ft	41.00-42.00
2 ft and under	*45.00-46.00*

Cast Iron Grades

No. 1 cupola	*40.00-41.00*
Heavy breakable	25.00-26.00
Foundry malleable	29.00-30.00
Unstripped motor blocks	30.00-31.00

Railroad Scrap

R. R. heavy melt (3 ft)	40.00-41.00

LOS ANGELES

No. 1 heavy melting	43.00-45.00
No. 2 heavy melting	40.00
No. 1 bundles	42.00
No. 2 bundles	29.00-30.00
No. 2 bundles (export)	30.00-31.00
Machine shop turnings	20.00
Shovel turnings	20.00
Cast iron borings	17.00-18.00
Electric furnace scrap	50.00-52.00

Cast Iron Grades

No. 1 cupola	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	43.00-45.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	49.00
No. 2 heavy melting	45.00
No. 2 bundles	35.00
Shovel turnings	18.00
Electric furnace	54.00

Cast Iron Grades

No. 1 cupola	41.00
Heavy breakable	38.00
Unstripped motor blocks	38.00
Stove plate (f.o.b. plant)	37.00

SEATTLE (Prepared, f.o.b. car)

No. 1 heavy melting	49.00
No. 1 hvy (unprepared)	44.00
No. 2 heavy melting	45.00
No. 2 hvy (unprepared)	40.00
No. 2 bundles	35.00
Shovel turnings	16.00-18.00
Electric furnace	52.00

Cast Iron Grades

No. 1 cupola	41.00
Heavy breakable cast	38.00
Stove plate (f.o.b. plant)	36.00
Unstripped motor blocks	37.00

SAN FRANCISCO

No. 1 heavy melting	*40.00***
No. 2 heavy melting	*37.00***
No. 1 bundles	*30.00***
No. 2 bundles	*25.00***
Machine shop turnings	*16.00*
Mixed borings, turnings	*16.00*
Cast iron borings	*16.00*
Heavy turnings	*16.00*
Shovel turnings	*16.00*

Cast Iron Grades

No. 1 cupola	47.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	30.00
No. 2 hvy melt, 2 ft & under	29.00
No. 1 bundles	31.00
No. 2 bundles	23.50
Mixed steel scrap	22.00
Mixed borings, turnings	12.00
Busheling, new factory: Prepared	30.00
Unprepared	24.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
‡Delivered.

(*Concluded from Page 105*))

a virtual standstill, with about 80 per cent of dealer operations closed down due to a strike which began Oct. 9. Yard stocks are full despite the curbing of intake by the strike.

Demand from both domestic and export buyers is weak, and a $5 price decline is predicted for next month. The Japanese have reduced their orders 30 per cent, and they are said to be seeking equalization of West Coast and Eastern prices.

• San Francisco — Prices are off $3-$4 a ton on the top grades of scrap. They may go lower. Japanese demand is weak at the moment (it may pick up in November and December). Local mills are taking little material.

Structural Shapes . . .

Structural Shape Prices, Page 94

Structural steel bookings in September amounted to 408,000 tons, the second best monthly total of the year. The highest was 456,332 tons in July. August bookings amounted to 384,981 tons, while the total for September, 1960, was 290,735.

Bookings in the first nine months this year amounted to 3,108,138 tons, up 10 per cent from the 2,826,138 tons booked in the like 1960 period.

Shipments in September this year were 326,164 tons vs. 359,467 in August. The total for the first nine months was 2,831,508 tons, off 2 per cent from the 2,910,786 tons moved in the same period last year.

October shipments of structural steel aren't likely to be any higher than they were last month. Demand peaked for the year in September and has been moving sidewise since then. Bookings for November are keeping pace with October's, but they show no noticeable improvement, which is not surprising considering the season.

Although wide flange beams are in relatively strong demand, standard structurals aren't moving too well, partly because of subnormal railroad industry consumption.

Fabricators' inventories are being held to minimum levels. They are buying only what's needed for jobs. Despite the possibility of a steel strike next year, they probably won't start stockpiling until March or April, being well aware that the industry's capacity for shapes has been increased substantially since 1959, the last time it was necessary to hedge against a strike.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2500 tons, plant, U. S. Gypsum Co. at Baltimore, through Baltimore Contractors Inc., Baltimore, to Lehigh Structural Steel Co., Allentown, Pa.

2300 tons, 14 highway structures, widening Route 128, Newton-Wellesley and Weston, Mass., to Phoenix Bridge Co., Phoenixville, Pa.; J. F. White Contracting Co., Westwood, Mass., general contractor.

600 tons, 12 story apartment, Realty Equities Corp., 6 E. 67th St., New York, Standard Structural Steel Co., Hartford, Conn.

STRUCTURAL STEEL PENDING

4116 tons, state bridgework, Route 80, Sec. 5R, Bergen County, New Jersey, bids Nov. 22; also required, 1205 tons of reinforcing steel.

1633 tons, state bridgework, Route L.R. 1005 (5-7), Lackawanna County, Pennsylvania, bids Nov. 10; also, 725 tons of reinforcing bars.

1300 tons, Washington State, Beebe Bridge, Columbia River; Troy T. Burnham, Seattle, low bidder at $1,315,536.

1027 tons, state bridgework, Route L.R. 163 (19B) and T.R. 29, Carbon County, Pennsylvania, bids Nov. 10; also, 474 tons of reinforcing bars.

535 tons, four state highway bridges, Ithaca, N. Y.; L. G. DeFelice & Son Co. Inc., North Haven, Conn., low on the general contract.

500 tons, also 20 tons of reinforcing steel, rebuilding Magnolia Bridge, Seattle; S. S. Mullen Inc., Seattle, low bidder at $1,138,240.

402 tons, state bridgework, Route 80, Sec. 4G, Passaic and Bergen counties, New Jersey, bids Nov. 10; 827 tons of reinforcing steel also required. In addition, 4100 linear ft of prestressed concrete beams, 30,000 linear ft of cast-in-place concrete piles, and 21,000 linear ft of steel piling are needed.

185 tons, state bridgework, Route L.R. 437 (1), Juniata County, Pennsylvania, bids Nov. 10; also, 65 tons of reinforcing bars.

65 tons, three schedules, tower steel; bids to Bonneville Power Administration, Portland, Oreg., postponed to Oct. 26.

REINFORCING BARS . . .

REINFORCING BARS PLACED

750 tons, 14 highway structures, widening Route 128, Newton-Wellesley and Weston, Mass., to Northern Steel Inc., Boston; J. F. White Contracting Co., Westwood, Mass., general contractor.

300 tons, Queen Anne High School gymnasium, Seattle, to Soule Steel Co., Seattle; Century Construction Co., Seattle, general contractor.

215 tons, four state highway bridges, Ithaca, N. Y., project UF-144 (2), through L. G. DeFelice & Son Inc., North Haven, Conn., general contractor, to Bethlehem Steel Co., Bethlehem, Pa.; 555 tons of structurals still pending.

60 tons, Metro sewer project, Seattle, to Pacific Coast Div., Seattle, Bethlehem Steel Co.; G. R. Leischner, Seattle, general contractor.

60 tons, Washington State underpass, Geiger Field, Spokane, Wash., to Pacific Coast Div., Seattle, Bethlehem Steel Co.; Henry Hagman, Spokane, general contractor at $76,962.

REINFORCING BARS PENDING

1205 feet, state bridgework, Route 80, Sec. 5R, Bergen County, New Jersey, bids Nov. 22; also, required, 4116 tons of structural steel, 22,200 linear ft of steel bearing piles.

1060 tons, Hackensack River bridge superstructure, Bergen County, New Jersey; bids to be opened by the State of New Jersey Highway Department, Trenton, N. J., Nov. 8.

1000 tons, East Bench unit, Clark Canyon Dam, Missouri River Basin project, near Dillon, Mont.; general contract by Bureau of Reclamation, Dillon, to Emil Anderson Construction Co. and Associates, Vancouver, B. C., awarded at $3,347,403.

975 tons, also 35 tons of structurals, Portage Bay Expressway, Seattle; MacRae Bros., Seattle, low bidder at $2,291,805 to the State Highway Commission.

900 tons, Presbyterian Home for the Aged, Seattle, general contract to Cawdrey & Vemo, Seattle.

827 tons, state bridgework, Route 80, Sec. 4G, Passaic and Bergen counties, New Jersey bids Nov. 10; also required, 402 tons of structural steel, 4100 linear ft of prestressed concrete beams, and 21,000 linear ft of steel piling.

725 tons, state bridgework, Route L.R. 1005 (5-7), Lackawanna County, Pennsylvania, bids Nov. 10; also, 1633 tons of shapes.

474 tons, state bridgework, Route L.R. 163 (19B) and T.R. 29, Carbon County, Pennsylvania, bids Nov. 10; also, 1027 tons of structurals.

355 tons, Idaho State, six highway spans, Bonneville County; bids to Boise, Idaho, Oct. 31.

250 tons, Lake Forest Park reservoir, Seattle; general contract to Mutual Construction Co., Seattle, low bidder at $1,028,148.

250 tons, also 300 tons of cast iron pipe, Seattle's Lake Forest reservoir; Mutual Construction Co., Seattle, low at $1,028,148.

200 tons, Washington State, Beebe Bridge, Columbia River; bids in.

210 tons, Washington State girder bridge, Clark County; bids to Olympia, Wash., Nov. 7.

200 tons, Judson Park Baptist Home, Seattle; Cawdrey & Vemo, Seattle, general contractor.

165 tons, Idaho State, highway projects, Adams and Ada counties; bids to Boise, Idaho, Nov. 14.

150 tons, Washington State, two spans, Pierce County; Woodworth & Co., Tacoma, Wash., low $157,038.

113 tons, three highway spans, near Boise, Idaho; bids to the Bureau of Public Roads, Boise, soon.

105 tons, state bridgework, Route L.R. 799 (4), Franklin County, Pennsylvania, bids Nov. 10.

PLATES . . .

PLATES PLACED

140 tons, 36 in. pipe, Atlas Powder Co., Wilmington, Del., through M. W. Kellogg Co., New York, to Charles F. Guyon, Brooklyn, N. Y.

100 tons or more, four tanks, 320,000 gallon capacity, Tappan Tank Terminal Inc., Hastings-on-Hudson, N. Y., to Chicago Bridge & Iron Co., Chicago.

PIPE . . .

CAST IRON PIPE PLACED

223 tons, 6, 8, and 12 in., Snoqualmie, Wash., to Pacific States Cast Iron Pipe Co., Seattle.

142 tons, 8 and 16 in., King County District No. 20, Seattle, to Pacific States Cast Iron Pipe Co., Seattle.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Argentina, 145 diesel-electric locomotives, with 70 going to International General Electric

(*Please turn to Page 111*)

Aluminum Sales to Beat 1960's

But the industry will still be bothered by a profit pinch

Nonferrous Metal Prices, Pages 110 & 111

THE ALUMINUM industry will sell considerably more metal this year than it did in 1960, but it won't make much more money. This should be the situation by yearend:

• Shipments will show a gain of about 4 per cent. John H. Krey, Reynolds Metals Co. vice president, forecasts they will run about 2,420,000 tons, not far under the record 2,480,000 tons of 1959. Last year, shipments were down to 2,332,000 tons. They have been improving all year; fourth quarter bookings are at the highest level of the year.

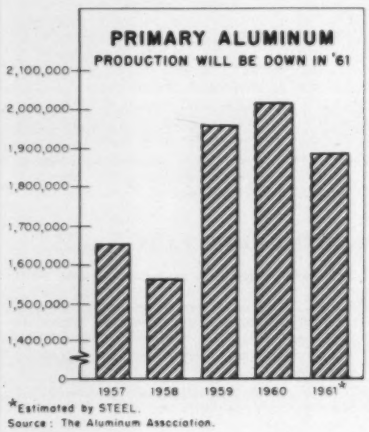
• Primary production will be down about 5 per cent. Last year, the industry produced a record 2,014,498 tons. STEEL estimates this year's output around 1,890,000 tons (see chart), the lowest since 1958. The industry overproduced in 1960 and entered 1961 with excessive stocks. This year, output has been more in line with demand, though some observers think producer stocks may still be a little too high.

• Prices are lower now. The industry was stunned when in late September ingot prices were dropped 2 cents a pound to 24 cents. The last change before then was in December, 1959, when the ingot price was hiked 1.3 cents a pound. Some mill product prices have been dropped as much as 2 cents a pound, but most of them are down ½ to 1 cent. Price fighting has been intense all year.

• Profits should be a shade better. Shareholder reports for the third quarter show that for the first nine months of the year earnings are running slightly behind those of the like 1960 period. Fourth quarter business may be good enough to overcome the deficit, despite lower prices.

The aluminum industry has been reeling under extreme price fighting. It has been particularly severe in mill products where profits on some lines are nonexistent. Costs are higher too; labor rates went up on Aug. 1.

• **Exports Down**—The extent domestic business has improved this year is not told by the cold statistics—they indicate a rise in shipments of around 4 per cent. It's significant that the gain has been achieved in the face of a sharp decline in exports. In 1960, the U. S. exported a record 284,801 tons of crude aluminum; this year, the total probably won't be half that.



Through August, crude exports were 91,500 tons compared with 209,500 tons in the same period last year. Mainly responsible for the drop: Large inventories in the hands of foreign users, many of whom have seen their own sales decline this year.

But scrap exports may hit a new high, besting last year's record of 79,561 tons. For the first eight months, scrap shipments abroad were 57,500 tons vs. 53,500 tons in the like 1960 period.

Imports are up. Over the first eight months, crude aluminum imports totaled 118,500 tons vs. 102,000 tons in 1960; semifabricated product exports were 34,500 tons compared with 27,800 tons last year. The biggest pickup has come in sheets and plates.

Magnesium Price Steady

Despite the recent drop in aluminum prices, the magnesium ingot quotation should continue to hold at 36 cents a pound, where it has been since 1956. Magnesium competes with aluminum mainly in the castings market where the bulk of aluminum is secondary rather than primary. Quotations are less stable in semifabricated shapes where price fighting continues to be a problem.

Copper Sales Gain

Copper sales continue to edge toward the best showing since 1956. U. S. deliveries to fabricators in September hit 126,744 tons, the highest since June. Production was down and producer stocks fell to 77,813 tons, the lowest since 1959. Deliveries outside the U. S. were also up, adding strength to forecasts that 1961 will set a new mark for copper sales in the Free World.

Brass Imports to Fall

Imports of brass mill products this year will be the lowest since 1956. Through August, imports had hit 68,188,000 lb, less than half the 1960 total of 164,021,000 lb.

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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 30 and 50 lb ingots, 24.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.20; No. 43, 25.30; No. 195, 26.70; No. 214, 28.10; No. 356, 26.00, 30 and 50 lb ingots.

Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $40 per lb and up nom.

Copper: Electrolytic, 31.00 deld; custom smelters, 31.00 nom; lake, 31.00 deld; fire refined, 30.75.

Germanium: Purified, ingots, less than 1 kg 37.50 per gram; 1-10 kg 32.00 per gram; 10 kg or more, 29.95 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld; 24-99 lb, $9.50; 100-449 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $188-191 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 81.25; 10-lb pig, unpacked, 89.00; "XX" nickel shot, 88.75; "F" nickel shot for addition to cast iron, in kegs, 81.75; "F" nickel, 5 lb ingots, 82.75. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.09. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 77.50.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $5.25 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 120.875.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max), $1.37 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.25.

Zinc: Prime Western, 11.50; brass special 11.70; intermediate, 11.70, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 12.35; special high grade, 12.50 deld. Diecasting alloy ingot No. 3, 13.75; No. 2, 14.25; No. 5, 14.00 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $7.25-7.75 per lb; 100-500 lb, $6.75-7.25 per lb; 500-1000 lb, $6.25-6.75; over 1000 lb, $6.25 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.00; No. 12 foundry alloy (No. 2 grade), 21.25; 5% silicon alloy, 0.60 Cu max, 23.00; 13 alloy, 0.60 Cu max, 23.00; 195 alloy, 24.25; 108 alloy, 21.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 22.75; grade 2, 21.50; grade 3, 20.50; grade 4, 19.50.

Brass Ingot: Red brass, No. 115, 32.00; tin bronze, No. 225, 41.25; No. 245, 35.75; high leaded tin bronze, No. 305, 36.00; No. 1 yellow, No. 405, 27.50; manganese bronze, No. 421, 31.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.98, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.98, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 36.35; l.c.l., 36.98. Weatherproof 20,000-lb lots, 37.05; l.c.l., 37.80.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $5.70-15.50; sheared mill plate, $4.45-9.00; wire, $5.00-9.50; forging billets, $3.00-4.75; hot-rolled and forged bars, $3.39-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $11.00-16.00; H.R. strip, $11.00-15.00; C.R. strip, $13.00-18.00; forged or H.R. bars, $11.00-15.00.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	147	126	145
Strip, C.R.	133	114	145
Plate, H.R.	134	116	133
Rod, Shapes, H.R.	116	95	116
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.183	24-72	72-180	44.40-47.00
0.183-0.154	24-72	72-180	44.40-47.00
0.154-0.120	24-72	72-180	44.90-47.80
0.120-0.096	24-72	72-180	44.90-47.80
0.096-0.076	24-72	72-180	45.40-49.30
0.076-0.060	24-72	72-180	45.90-50.10
0.060-0.047	24-72	72-180	46.40-51.30
0.047-0.037	24-72	72-180	46.90-52.70
0.037-0.030	24-72	72-180	47.40-54.30
0.030-0.023	24-60	72-180	47.90-56.10
0.023-0.018	24-48	72-144	48.40-56.40
0.018-0.014	24-48	72-144	50.20-57.00
0.014-0.011	24-48	72-144	52.50-59.00
0.011-0.0085	24-36	72-96	55.20
0.0085-0.007	24-36	72-96	58.20
0.007-0.006	24-36	72-96	61.00

ALUMINUM (continued)

Plates: 1100, 3003, and 5005, mill finish, 0, H12, and H14 tempers, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
3.000-2.000	6-144	72-240	45.10-50.00
2.000-1.251	6-144	72-240	45.50-50.30
1.251-0.751	6-144	72-240	44.50-49.60
0.751-0.250	6-144	72-240	44.50-49.60

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	76.30	....	....
0.188	63.20	62.20	....	79.10
0.250	60.00	61.60	72.70	73.10
0.375	59.20	62.80	71.00	71.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	62.80	71.00	71.00
0.625	59.20	62.80	67.80	66.90
0.750	57.70	61.00	61.60	62.80
0.875	57.70	61.00	61.60	62.80
1.000	57.70	61.00	61.60	62.80
1.125	55.30	58.50	59.50	60.50
1.375	55.30	58.50	59.50	60.50
1.500	55.30	58.50	59.50	60.50
1.625	53.00	55.70	....	58.30
1.750	53.00	55.70	58.30	58.30
1.875	53.00	55.70	....	58.30
2.000	53.00	55.70	58.30	58.30
2.250	51.50	54.00	....	58.30
2.500	51.50	54.00	....	58.30
2.750	49.90	52.20	....	58.30
3.000	49.00	52.20	....	58.30
3.250	....	52.20	....	....
3.375	....	52.20	....	....

Selected sizes.

Forging Stock: Rounds, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 45.50-55.60; 6061, 41.50-55.60; 7075, 56.50-64.60; 7079, 58.50-66.60.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.90; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Extruded Solid Shapes

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.00
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. width: .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	(AZ31C) Com. Grade	(AZ31B) Spec. Grades
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.75-24.25; No. 2 heavy copper and wire, 21.75-22.25; light copper, 19.00-19.50; No. 1 composition red brass, 21.50-22.00; No. 1

BRASS MILL PRICES

MILL PRODUCTS a

(Copper or Copper Alloy No.)	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes
Copper (110)	56.13b	50.36-51.36	....	57.32
Yellow Brass (268, 270)	49.27	38.77c	49.56	53.43
Low Brass, 80% (240)	52.15	52.09	52.44	56.21
Red Brass, 85% (230)	53.17	53.11	53.46	57.23
Com. Bronze, 90% (220)	54.73	54.67	55.02	58.54
Manganese Bronze (675)	57.69	51.27	61.54	....
Muntz Metal (365)	51.94	47.25	....	....
Naval Brass (464)	53.94	47.75	60.25	58.10
Silicon Bronze (651)	61.39	60.58	60.68	79.80
Nickel Silver, 10% (745)	65.56	67.16	66.91	....
Phos. Bronze, A-5% (510)	76.97	77.47	76.72	78.90

SCRAP ALLOWANCES d (Based on copper at 31.00c)

Clean Heavy	Rod Ends	Clean Turnings
27.00	27.00	26.25
20.375	19.50c	18.50c
22.875	22.625	22.125
23.875	23.625	23.125
24.75	24.50	24.00
19.25	19.00	18.50
19.125	18.875	18.375
19.00	18.75	18.25
26.50	26.25	25.75
26.00	25.75	13.00
28.50	28.25	27.25

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Free cutting. d. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 20.50-21.00; new brass clippings, 16.25-16.75; light brass, 13.25-13.75; heavy yellow brass, 14.25-14.75; new brass rod ends, 14.25-14.75; auto radiators, unsweated, 16.50-17.00; cocks and faucets, 16.50-17.00; brass pipe, 16.50-17.00.

Lead: Soft scrap lead, 7.25-7.50; battery plates, 3.00-3.25; linotype and stereotype, 8.50-8.75; electrotype, 8.00-8.25; mixed babbitt, 10.00-10.50.

Monel: Clippings, 26.00-26.50; old sheets, 25.00-25.50; turnings, 18.50-19.00; rods, 25.00-25.50.

Nickel: Sheets and clips, 56.00-58.00; rolled anodes, 56.00-58.00; turnings, 43.00; rod ends, 56.00-58.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 3.00-3.50; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 8.50-9.00; clean borings and turnings, 3.00-3.50; segregated high copper clips, 9.25-9.75; mixed low copper clips, 9.75-10.25; mixed high copper clips, 9.25-9.75.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 8.50-9.00; clean borings and turnings, 7.00-7.50; segregated low copper clips, 14.00-14.50; segregated high copper clips, 12.50-13.50; mixed low copper clips, 12.00-13.00; mixed high copper clips, 11.00-12.00.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 9.75; clean borings and turnings, 8.50; segregated low copper clips, 13.00; segregated high copper clips, 12.25; mixed low copper clips, 12.50; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not les than 1.5% Be, 57.00; light scrap, 52.00; turnings and borings, 37.00.

Copper and Brass: No. 1 heavy copper and wire, 27.25; No. 2 heavy copper and wire, 25.25; light copper, 23.00; refinery brass (60% copper) dry copper content, 24.00.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 27.25; No. 2 heavy copper and wire, 25.25; light copper, 23.00; No. 1 composition borings, 24.00; No. 1 composition solids, 24.50; heavy yellow brass solids, 18.00; yellow brass turnings, 16.50; radiators, 20.00.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.50; oval, 44.50; electrodeposited, 37.50; cast, 42.50, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 117.50; 500-1999 lb, 110.50; 2000-4999 lb, 107.00; 5000-29,999 lb, 106.00; 30,000 lb, 105.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 139.50; 200-499 lb, 138.00; 500-999 lb, 137.50; 1000 lb or more, 137.00.

Zinc: Balls, 18.25; flat tops, 18.25; flats, 21.00; ovals, 20.85, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chrome Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.50; 2000-5900 lb, 13.50; 6000-11,900 lb, 13.25; 12,000-22,900 lb, 13.00; 23,000 lb or more, 12.50.

Nickel-Chloride: 100 lb, 47.50; 200 lb, 45.50; 300 lb, 44.50; 400-4900 lb, 42.50; 500-9900 lb, 40.50; 10,000 lb or more, 39.50.

Nickel Sulphate: 5000-22,999 lb, 31.00; 23,000-39,900 lb, 30.50; 40,000 lb or more, 30.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 88.70; 100-600 lb, 79.00; 700-1900 lb, 76.30; 2000-9990 lb, 74.40; 10,000 lb or more, 73.10.

Stannous Chloride (Anhydrous): 100 lb, 147.80; 400 lb, 137.80; 800-19,000 lb, 116.50; 20,000 lb or more, 112.30.

Stannous Sulphate: Less than 50 lb, 155.10; 50 lb, 125.10; 100-1900 lb, 123.10; 2000 lb or more, 121.10.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 107*)

and 75 to General Motors Overseas.

Amitou & Pikes Peak, two diesel electric passenger units, to Swiss Locomotive & Machine Works, Winterthur, Switzerland.

RAILROAD CARS PLACED

Atlantic Coast Line, 70 aluminum trailer vans, to Dorsey Trailers, Elba, Ala.

Stainless Steel . . .

Stainless Steel Prices, Page 100

Stainless steel products are in strong demand, thanks to a seasonal upturn in auto industry consumption and increased buying by other consumers whose inventories aren't big enough to sustain expanding manufacturing schedules. From a shipping standpoint, October promises to be the best month so far this year. Some mills are shipping at 80 to 85 per cent of capacity. November may surpass October.

Production of stainless steel totaled 824,999 net tons in the first nine months this year, a near record, reports the American Iron & Steel Institute. The total is the highest for the period since 1956 (849,746 tons) and has been exceeded slightly on only two other occasions — during the first three quarters of 1955 (879,183 tons) and 1953 (836,403).

September production amounted to 117,139 net tons, highest in 19 months. The total compares with 106,884 in August and 74,096 in September, 1960.

September Ore Movement Ahead of Year Ago Pace

In September (for the first time this year) iron ore shipments down the Great Lakes route amounted to more than the tonnage shipped in the corresponding month a year ago, reports Oliver T. Burnham, vice president, Lake Carriers' Association. September ore cargoes totaled 9,026,216 gross tons, or 664,996 tons more than were moved in September, 1960.

Lake Superior ore shipments in the 1961 shipping season to Oct. 1 amounted to 43,114,280 gross tons, off sharply from the 60,680,434 tons moved in the same period of the 1960 season, but up from the 37,134,135 tons moved in the same period of 1959 when lake shipments were curtailed by the steel strike during the summer that year.

Tubular Goods . . .

Tubular Goods Prices, Page 100

October shipments of oil country goods will equal or slightly exceed last month's, but they won't come up to August's because of the hedging done that month by Texas buyers in seeking to avoid a state tax—it became effective Aug. 31.

Since deliveries are prompt, users have little incentive to place advance orders. Tubemakers are hoping shipments in November will equal October's. Much of the steel the mills are shipping is going into their downriver stocks.

Rotary oil rig operations in the U. S. and Canada have sagged to the lowest point in more than three months, Hughes Tool Co.'s report for the week ended Oct. 16 shows. The total was 1948, lowest since June 26 when the count was 1942. The U. S. had 1797 rigs working, a decrease of 51 for the week. A year ago, active rigs totalled 1737. In

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Help Wanted

WANTED — ASSISTANT SUPERINTENDENT blast furnace operation. Young well established completely integrated steel company located in great southwest area needs to fill key position in its blast furnace department with well qualified man age limit 45 years. Company currently engaged in multi-million dollar expansion program. Excellent opportunity. Submit complete resume giving personal history, education, experience and salary requirements. All replies held confidential. Box 961, STEEL, Penton Bldg., Cleveland 13, Ohio.

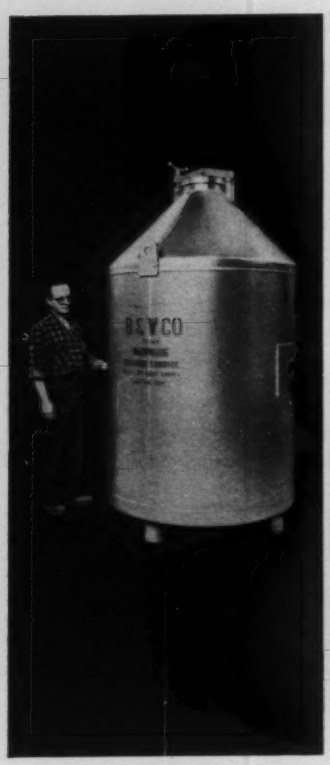
FERROUS METALLURGIST

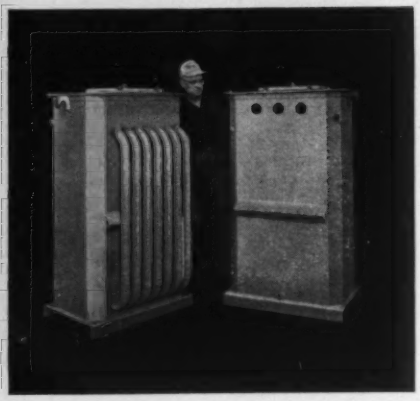
Company engaged in extractive and pyrometallurgy requires well qualified graduate metallurgist for production, development and quality control who has experience in one or more of the following: smelting and refining, steel making, or electric furnace operation. Excellent opportunities for qualified man. Hospitalization, insurance, profit sharing and pension plan provided cost free by company. Opening at Kentucky plant. All replies held strictly confidential. Submit detailed resume, including educational and employment backgrounds, as well as salary requirements to Box 967, STEEL, Penton Bldg., Cleveland 13, Ohio.

EXPERIENCED SALES REPRESENTATIVE to cover iron and steel industries in northeast section of the country. Fifty years of age and under. Submit resume, giving education, experience, salary requirements, all traveling expenses paid. Write Such Clay Company, P. O. Box 47, Perth Amboy, New Jersey.

Positions Wanted

Plant Supervision, excellent background in boiler, pressure vessel and weldment fabrication. Experience includes nonferrous metals. Write Box 970, STEEL, Penton Bldg., Cleveland 13, Ohio.





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Canada, 151 rigs were operating in the latest week of record, down 19 for the week.

The Texas Railroad Commission has set an eight day producing schedule for regulated wells in November. The eight day month is the eighth in this year. Because of the 30 day month as compared to October's 31 days, daily production will increase 48,548 barrels to an estimated 2,706,095 barrels.

Oklahoma Illinois Gas Pipeline Co. is expected to apply to the Federal Power Commission for a 600 mile gas transmission line from western Oklahoma to St. Louis. The move is expected before Jan. 1.

Demand for mechanical tubing has fallen in the wake of the auto industry strikes. However, orders for November are running slightly ahead of those that were on mill books for October a month ago.

Distributors . . .

Prices, Page 101

Steel distributors report a pickup in demand, some as much as 15 to 20 per cent. Over-all volume continues disappointing, but further gains are expected, especially if automotive requirements for steel perk up and result in some lengthening of mill deliveries.

In general, the service centers are not under great demand pressure for any one item. Building steel is moving a little less actively seasonally, but substantial buying for repairs and replacements continues. There is little evidence of any hedge buying against possible price increases. However, service center prices appear to be a little firmer than they have been in past months.

Imported steel continues an important market factor at many points. In the Pacific Northwest, it was reported last week that some Japanese sheet tonnage was being offered at below domestic market price levels.

Plates . . .

Plate Prices, Page 94

Activity in the plate market appears to have reached a peak in September. October shipments are likely to be about the same as last month's, and there's no evidence of an uptrend in bookings for November.

Heavy plates are in strongest demand, reflecting improved buying by machinery builders, fabricators, and missile subcontractors.

Delivery promises from wide mills are unchanged at six to eight weeks. Users are keeping their inventories at minimum levels. Fabricators are buying only to cover contracts.

Cramp Shipbuilding Corp.'s yard at Camden, N. J., will be reactivated for shipbuilding and major ship conversion by new owners, the Terminal Warehouse Co.

Tin Plate . . .

Tin Plate Prices, Page 96

Prices set by can manufacturers on soft drink containers made of thin tin plate are about 2 per cent less than prices on those made of standard tin plate. One canmaker reports: Prices on its thin tin plate cans are $36.89 per 1000, 12 ounce cans—about 82 cents per 1000 less than those of cans made of conventional tin plate. A second large canmaker says its prices are 80 to 82 cents per 1000 under those of comparable conventional tin plate cans.

The new soft drink cans are still largely in the test stage. One canmaker says they are available only in test quantities and aren't expected to reach the commercial level until yearend. A second large producer reports its laboratories are testing the adaptability of the new cans to major soft drinks.

New Type Tubing Stock Plan Offered by Frasse

A new type tubing inventory has been made available to customers by Peter A. Frasse & Co. Inc., steel and aluminum service center operator with headquarters in New York. The key to the plan is the "standard footage stocked" quantities that are used in place of the conventional "feet in stock" figures.

Standard footage stocked figures, says the company, are quantities that company policy calls for to be on hand at all times. They are arrived at by study of sales statistics, leadtimes required to replace stock, and other factors. The resulting quantities, not being subject to day-to-day fluctuations, are more serviceable to the customer. A 16 page steel tubing inventory listing is available from the company.

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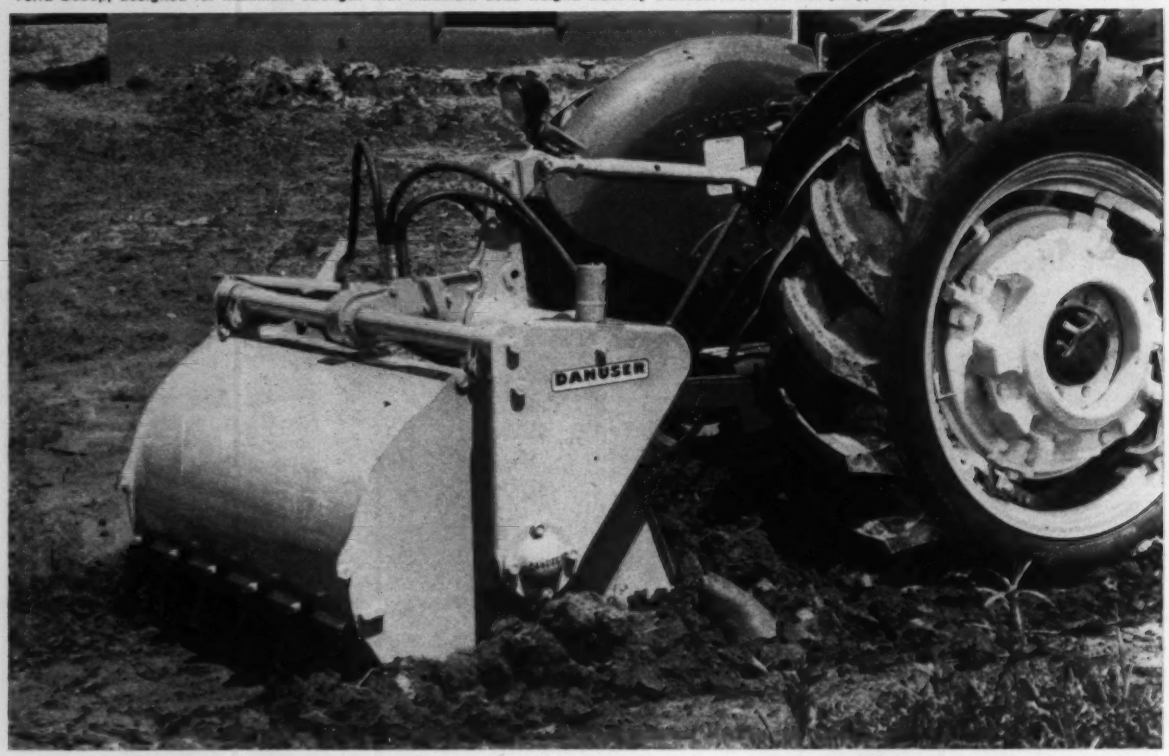
TO FIND THE MAN YOU NEED . . .

Place an advertisement in the "Help Wanted" columns of STEEL's classified pages. Your advertisement will reach the qualified men you need, because STEEL is addressed to highly-trained men in all phases of metalworking.

STEEL
The Metalworking Weekly

Now **you can get USS "T-1" Steel from Steel Service Centers coast to coast**

Terra Scoop, designed for maximum strength with minimum dead weight. Built by Danuser Machine Company, Fulton, Mo. Weighs only 540 pounds.



Lightweight scoop built strong and rigid with USS "T-1" Steel

The big problem in designing the "Terra Scoop," a bucket with over ½-yard capacity for small tractors, was to obtain great strength and rigidity without exceeding size and weight limitations.

The first prototype scoop bulged at the ends and couldn't be used. That's where USS "T-1" Steel entered the picture. With a minimum yield strength of 100,000 psi, ¼-inch plates of "T-1" Steel gave the Terra Scoop all the strength it needed—and more, too—without increasing weight.

Since then, many Terra Scoops have been sold. *Not a single failure has been recorded in any of the end plates*—thanks to the extra yield strength of USS "T-1" Steel. What's more, the high resistance of "T-1" Steel to impact abrasion and corrosion has added years to scoop life.

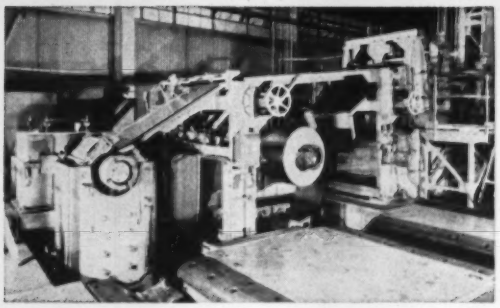
Fabrication advantages. During initial testing, it was established that flame cutting, by which the end plate is made, actually imparts a superior hardness to the edge which functions as a cam in the operating mechanism. This edge has to retain its hardness to prevent peening from hardened rollers with which it comes in contact. Welding and machining were accomplished without difficulty using recommended shop methods.

USS "T-1" Steel and the new lower priced "T-1" type A Steel can be furnished to a minimum yield strength of 100,000 psi, or a minimum hardness of 321 Brinell, depending on application. USS "T-1" Steel can also be furnished to 360 Brinell. All of these tough, weldable steels can reduce weight and increase the strength and life of your equipment. Call your local Steel Service Center for more information. Or, for the name of the distributor of USS "T-1" Steels nearest you, write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. USS and "T-1" are registered trademarks.

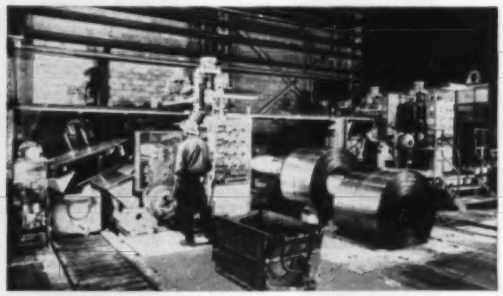
United States Steel Corporation · Columbia-Geneva Steel Division · National Tube Division · Tennessee Coal and Iron Division · United States Steel Export Company

USS United States Steel

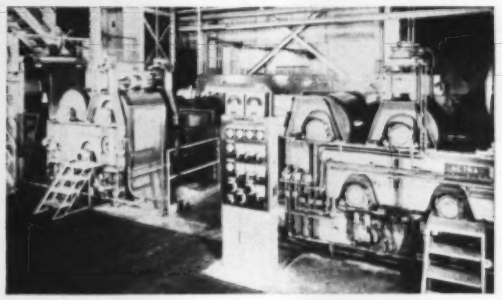
Continuous Annealing and Surface Treatment Lines have a lot in common



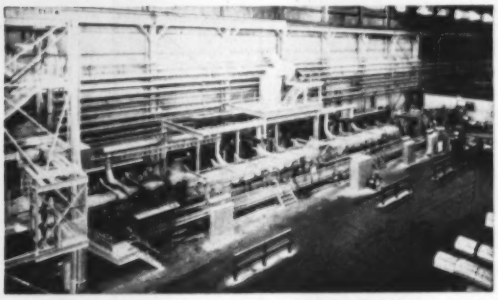
Delivery end shows recoiling.



Entry Section with uncoiling and scrap handling.



Multiple Bridle Rolls help maintain constant tension.



Strip Cleaning (horizontal) includes scrubbers and cleaning tanks.

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300 Sixth Avenue, Pittsburgh 22, Pennsylvania

Blaw-Knox designs and manufactures for America's growth industries: METALS: Rolling Mills • Steel Processing Lines • Rolls • Castings • Open Hearth Specialties • PROCESSING: Process Design, Engineering and Plant Construction Services • Process Equipment and Pressure Piping • CONSTRUCTION: Concrete and Bituminous Paving Machines • Concrete Batching Plants and Forms Gratings • AEROSPACE: Fixed and Steerable Antennas • Radio Telescopes Towers and Special Structures • POWER: Power Plant Specialties and Valves

Good tracking and accurate tension are essential in Continuous Annealing Lines and Surface Treatment Lines. This loop tower stores strip and makes possible continuous operation.

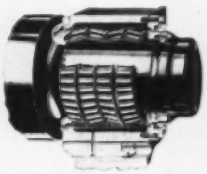
Lower operating costs on hot strip mill with modern Timken® back-up roll bearings

When this 56-inch semi-continuous hot strip mill was built, the operator wanted to be sure it would roll silicon, high alloy, carbon and stainless steels at the lowest possible operating cost per ton. They made sure by mounting back-up rolls on modern Timken® tapered roller bearings. Operating cost savings have been proved by acutal case studies on hot strip mills in the steel industry.

Timken bearings use low-cost lubrication and they eliminate costly mill downtime due to damaged bearings and failure of the lubrication system. Because they virtually eliminate friction, mills start up easier, bearings and rolls last longer.

Modern Timken balanced proportioned bearings in back-up roll positions on new mills are being designed to provide: 1) 10% roll turn down, 2) Roll neck diameters which are 70% of the minimum roll barrel diameter, 3) Normal roll neck stresses of 8,500 pounds per square inch. For the most in bearing performance and engineering service when you buy or build a mill. specify Timken bearings.

The Timken Roller Bearing Company, Canton 6, Ohio. Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits. Canadian Division: Canadian Timken, St. Thomas, Ontario.



Industry rolls on

TIMKEN®

tapered roller bearings